A collection of white papers designed to prepare our students for the workplace of the year 2010.

February 24-25, 2000
Grand Island, Nebraska

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(Insert Foreword Here)

--CONFERENCE BACKGOUND--

The purpose of Educational Technology 2010 was to gather together educators, policy makers, and business leaders to focus on the future of education and technology in the state of Nebraska. Over 185 Participants from over 30 entities [See Appendix A] were invited to review the:

- current infrastructure
- installed hardware / software base
- student and educator technology competencies
- curriculum integration

Over 125 participants [See Appendix B] discussed and developed plans for dealing with the changes needed to prepare students for the workplace of 2010 and beyond. Some of the questions addressed included:

- What will the workplace look like in the year 2010?
- What skills must be presented to learners to prepare them for the 2010 workforce?
- How must educational institutions change in order to better prepare teachers and students?

This event was jointly sponsored by the following organizations:

Nebraska Governor Johanns and Lieutenant Governor Maurstad
Nebraska Information Technology Commission (NITC)
Education Council of the NITC
Nebraska Department of Education
ESUs of Nebraska
AIM Institute of Omaha
Education Commission of the States

The planning committee consisted of:

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Dixie Griffin Good, Education Commission of the States
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Alan Wibbels, Educational Service Unit 10
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--INTRODUCTION--

The six white papers presented in this collection are organized around the six principle priorities of the Education Council [See Appendix C], one of the three main advisory groups of the Nebraska Information Technology Commission.
http://www.nitc.state.ne.us/

The sector priorities proved to be a wonderful organizer to the group products and proceedings developed from the Educational Technology 2010 Conference. Facilitated by nationally known presenter, Ian Jukes, small group and large group work sessions generated invaluable content used to set a course for student/learner preparation for the next decade.

Six focus groups organized themselves around the sector priorities immediately after the conference to distill the group products into workable suggestions and cohesive strategies needed to implement each priority. Led by a focus group facilitator [See Appendix D], the individual groups met virtually and face-to-face for five months until a white paper was constructed.

The white papers are intended to act as roadmaps for implementation of the Education Council priorities and to ensure the success of our learners in the workplace of the future by: Building the appropriate infrastructure, providing diverse training opportunities, ensuring life cycle funding, addressing the needs of the learner, encouraging public/private partnerships, and pursuing leading edge technology applications.

In some cases, the white papers implicate a specific policy or funding source that must be revised or revisited. In other cases, the white papers call attention to dramatic statistics. And, in still other examples, the white papers simply put in print best practices or reminders of pedagogical concerns that must be addressed as we educate our students.

Educational technology is the glue that binds all these efforts together. Nebraska has enjoyed early progress in networking, hardware deployment, and training. The success of our learners will depend to a large degree on our ability to maintain that early prowess with life cycle funding and replacement strategies. This comes at a time when some critical technology funding sources are being depleted, halted, or reallocated into other programs.

It is hoped that you read and enjoy these white papers and find at least one that speaks to your professional capacity and passion.   -Editor

--EXECUTIVE SUMMARY--

Achieving Nebraska's Future Educational Telecommunications Infrastructure

AWhite Paper written by the
**Educational Technology 2010
Infrastructure Follow-up Group**

Providing an infrastructure that will permit all citizens of Nebraska to have access to the same educational experiences, regardless of location.

I. Overview

The purpose of this paper is to recommend the specific steps necessary to achieve the Education Council's priority of "Providing an infrastructure that will permit all citizens of Nebraska to have access to the same educational experiences, regardless of location."

In order to ensure Nebraska's leadership role in supporting an infrastructure that will permit all citizens of Nebraska to have access to the same educational experiences, regardless of location, this white paper will:

▪ Reinforce the "prime contractor" recommendation of the Telecommunications Infrastructure Needs Assessment (TINA) study [See appendix E]
> The RFP for a prime contractor must include:
> - a scalable design
> - allowances for emerging technologies
> - a common understanding of level of service and quality of service
> - a "service center" for users if they question their service or have problems
- Offer some funding recommendations related to infrastructure.

II. Recommendations

As a further validation of the "prime contractor" concept adopted by the NITC, nearly half of the recommendations from the February 2000 Ed Tech 2010 Infrastructure working group were related to some aspect of the need for a "prime contractor" infrastructure plan.

In order to preserve the "grass roots" suggestions that were related to the prime contractor concept, the following is a list of those suggestions from the 2010 infrastructure focus group that aligned with some aspect of a prime contractor concept:

- Cooperation between telephone companies must be developed;
- Create a state backbone for connectivity;
- Steps should be taken to reduce the challenge of geography;

- Schools will need assistance in negotiating contracts with telecommunications providers;
- Schools can leverage their negotiating power by combining with government and business;
- Nontraditional carriers should be considered by the Division of Communications (DOC);
- Long-term commitments are necessary for providers to invest in user equipment at fiber termination points;
- The most cost effective level and quality of service should be recommended by DOC;
- Costs to geographical areas should be averaged (a distance insensitive or "postalized" rate).

Funding Issues related to infrastructure development

- The State should fund satellite and terrestrial as a single infrastructure plan;
- More money is not necessarily the answer, policy changes or money being directed in the right direction is more important;
- States that have implemented successful infrastructure initiatives have been given direction by and have the initiative spearheaded by the governor;
- Policies detrimental to furthering of technology (i.e. local property tax lid) should be relaxed;
- Policies preventing public-private partnerships should be relaxed.

III. Nebraska Background

K-12 Perspective -
In 1995 the Legislature passed LB860 which provided funds (from the former Weatherization Loan Program) to connect districts to the Internet and computer network wire school buildings. As a result of LB860/Rule88, all of the approximate 300 class 2 - 6 districts and a number of the class 1 districts are connected to the Internet with either 56KB or T1 data lines. Also, about this time, (funded generally by excellence in education grants) districts began to install distance learning classrooms. As a result, over 200 of the class 2 - 6 districts have a distance learning classroom. At the K-12 level alone, between Internet data usage and distance learning, bandwidth demand is significant; therefore, there is great need for a statewide electronic infrastructure.

Higher Education Perspective -
The community and state colleges began connecting to the Internet around 1991-92 with technical assistance from the State Division of Communications. The university system, being a part of the early ARPANET (pre-Internet), provided a model and some technical expertise in connecting the other higher education institutions to the Internet as well as K-12. Also, during the early 90s, as distance learning consortiums were being formed to apply for excellence in education funds, many of the community colleges and some of the state colleges joined these consortiums. As a result, nearly one third of all distance learning classes originate from these higher education institutions.

Moving Towards a Solution -

In November of 1998 the NITC recommended that a Telecommunications Infrastructure Needs Assessment (TINA) study be completed. The State Division of Communications (DOC) issued an RFP to find a consultant group to conduct the study. The study was completed in December of 1999. In April of 2000 one of the alternatives from the study was that the State pursue a "prime contractor" concept. The suggestion was presented to the NITC and subsequently adopted by them at their April 20, 2000 meeting. A TINA Advisory Committee has been established to assist with the implementation of this plan.

IV. National Background

A report entitled, "National Profile of Statewide Education Networks," commissioned by EDvanceNet, provides a "snapshot" of statewide education networks. Of the thirty-four states that responded to the survey in January of 1999, 71% reported having a statewide education network that serves the K-12 community. The dominant funding source for statewide education networks is state funds appropriated by the legislature. Fees paid by school districts or end-users made up a smaller portion, while a few reported multiple funding sources.

A recent Center for Digital Government report indicated that 90 percent of the states have implemented a statewide information technology infrastructure and 70 percent of the states have established boards, commissions or councils to oversee statewide information telecommunications policies.

V. Summary

It is important to note that nearly half of the recommendations from the "grass roots" efforts of the Ed Tech 2010 Infrastructure Working Group align with the "prime contractor" concept adopted by the NITC. This reinforces the appropriateness of the prime contractor concept and lends support to the fact that the concept should be implemented in an expeditious manner.

NEHEIT (Nebraska Higher Education Information Technology group), an organization of professionals employed by the Higher Education community of Nebraska, both public and private suggested the following:

> ...to best serve the interests of the State we need to create a single IP based network...The advantage of using an IP based network is that all of these technologies can be integrated....The network should be compatible with the national and international networks that it uses for broader connectivity.

It is also important to note that infrastructure related long-term funding policies need to be in place that will enhance statewide utilization and enable access by all citizens of Nebraska.

The cost of a comprehensive statewide electronic backbone plan could well be revenue neutral, given the multitude of separate "networks" across the state at this time. In addition, through aggregation and a comprehensive network design, bandwidth could potentially be increased.

Providing Diverse Training Opportunities for Students, Teachers, and Administrators

AWhite Paper written by the
Educational Technology 2010
Training Follow-up Group

Identifying and facilitating diverse training opportunities

I.   Overview

Nebraska is a national leader in the area of school technology. Eighty-seven percent of Nebraska's schools have Internet access from one or more classrooms. In Technology Counts '99, Nebraska reports a ratio of one instructional multimedia/Internet computer per seven students. (http://edweek.org/sreports/tc99/articles/summary.htm)

The all-important question is: How can technology be used most effectively to benefit teaching and learning?

If technology is to be used by students, educators must possess the confidence, understanding and skills to effectively incorporate technology into their educational practices. Properly trained educators will ensure that schools will achieve the maximum return on its technology investment.

In a 1995 study, the U.S. Office of Technology Assessment (OTA) found that the lack of teacher training is one of the greatest roadblocks to integrating technology into a school's curriculum. Teacher training in the effective use of technology in the classroom was, in many cases, inadequate, piecemeal and poorly timed and emphasized the mechanics of computer operation rather than learning how to use technology as a teaching tool.

In addition, OTA found inadequate staffing and resources for teachers' use of technology, with onsite technical support unavailable in many places. Most school districts spend less than 15 percent of their technology budgets on teacher training and development. (http://www.ota.nap.edu/pdf/data/1995/9522.PDF)

The National Staff Development Council (NSDC) believes effective use of technology to promote high levels of learning for all students requires integrating technology into a standards-based instructional program and providing teachers with abundant professional development related to its instructional uses. Teachers should be provided with time to learn, plan and practice what they have learned. (http://www.nsdc.org/standards.htm)

The Fall 1996 article in the Journal of Staff Development, "Exploring the Relationship Between Staff Development and Improvements in Student Learning, " documents that the connections between staff development and improved student learning is becoming more crucial. Thomas R. Guskey and Dennis Sparks contend that technology training must

address "the bottom line" in education: What was the impact on students? Did the professional development program or activity assist students in any way? Educators should be able to document the benefits through multiple evaluation procedures. (http://www.nsdc.org/library/jsd/f_gusky.html)

II. Recommendations

A. Technology training opportunities must comply with the NDE Staff Development Policy approved by the State Board of Education, June 1998.

B. All PreK-12 school applications for state funding in Educational Technology must align with the NDE K-12 State Technology Plan that includes the Nebraska and Student Essential Learnings in Technology.

C. All PreK-12 school applications for state funding in Educational Technology must align with the NDE Staff Development Policy .

D. The State Board of Education should require educators to meet the NDE Educator Competencies in Technology for teacher certification and recertification.

E. NDE Educator Competencies in Technology should be included in Rule 34 (Regulations Regarding Approval of Teacher Evaluation Policies) as part of performance-based teacher evaluation policies and procedures for school districts and ESUs. (http://www.nde.state.ne.us/LEGAL/rule34.pdf)

F. School Technology Plans should align with the School Improvement in Rule 10 and are evaluated on the same cycle. (http://www.nde.state.ne.us/LEGAL/rule10.pdf)

G. Local school districts should devote at least 30 percent of their technology budgets to teacher development and initiating teacher learning simultaneously with purchase of the technology as recommended by NSDC.

H. Local school districts should provide a full-time, on-site technology coordinator to support educators in the use of technology.

I. NDE should designate a certification and/or a teaching endorsement in Educational Technology.

J. Local school district policies should allow Educational Technology coursework to apply in all curricular graduate degree programs.

K. Local school district policies should allow LAN/WAN coursework to apply in all curricular graduate degree programs.

III.   Nebraska Background

K-12 Perspective
Nebraska educators have many opportunities for technology training. It is available at their local school districts, regional Educational Service Units, (ESU) statewide conferences or post-secondary institutions through multiple modes: face-to-face interaction, telecommunications or on-line courses.   The Educational Service Unit Accountability Report of March 2000 shows that thirty percent of the programs provided by regional ESUs were in the category of Instructional Technology.

The Nebraska Department of Education (NDE), with the State Board of Education's approval established the following Staff Development objective in the K-12 State Technology Plan (http://www.nde.state.ne.us/TECHCEN/mission/mission.htm):

For all educators and school staff members to have appropriate access to staff development promoting effective use of technology within the context of their responsibilities.

The Nebraska Student Essential Learnings in Technology (http://www.nde.state.ne.us/TECHCEN/nebr/ntct.html) and Educator Competencies in Technology (http://www.edneb.org/TECHCEN/comp/comp.htm) are included in the plan. These document were created by a task force made up of representatives from NDE, Nebraska State Education Association (NSEA), Nebraska Education Technology Association (NETA), K-12 Classroom Teachers, Higher Education, Technology Coordinators and ESUs. It is based on the International Society for Technology in Education (ISTE) National Education Technology Standards for Students (NETS).

State Conferences
The Nebraska Educational Technology Association (NETA (http://neta.lps.org/) provides an annual conference that is attended by over 1,500 educators each spring. The Midwest Internet Institute (MII) (http://www.lps.org/org/mii/) promotes Internet-based learning activities each summer. Educational Service Units host regional Technology Fairs throughout the state each fall and winter.

Each of these conferences provide sessions and workshops conducted by state teachers for their peers. the presenters model best teaching practices, successful projected-based learning and student-oriented classroom activities.

Current sources of funding for technology training (Appendix ?):
Local tax base
Local foundations
Education Internet System
Core Services Fund for ESUs
School Technology Fund
Education Innovation Fund
NEB*SAT Grants to Schools

Higher Education Perspective
Nebraska post-secondary institutions offer undergraduate courses and Masters degrees in Educational/Instructional Technology.

The S.T.E.P. project creates a model of partnership between schools of education and K-12 school districts that prepares preservice teachers to be effective users of technology. This project creates collaborative teams of methods teachers and K-12 teachers to integrate and model technology tools in the preservice curriculum.

IV. National Background

The Office of Educational Technology (OET), under the leadership of Linda Roberts, has undertaken a strategic review and revision of the national educational technology plan to be completed by Fall of 2000. The OET has identified five emerging priorities, each of which has a detailed description on the OET website http://www.ed.gov/Technology:

1. All students and teachers will have access to effective information technology in their classrooms, schools, communities, and homes.
2. All teachers will effectively use technology.
3. All students will be technologically literate and responsible cybercitizens.
4. Research, development and evaluation will shape the next generation of technology applications for teaching and learning.
5. Education will drive the E-learning economy.

Getting America's Students Ready for the 21st Century: Meeting the Technology Literacy Challenge - A Report to the Nation on Technology and Education June 29,1996
(http://www.ed.gov/Technology/Plan/NatTechPlan/priority.html)
The president believes we must help America's learners be prepared to meet the challenges of the 21st century. In his State of the Union address in January 1996, he challenged the nation, saying "every classroom in America must be connected to the information superhighway with computers and good software and well-trained teachers."

To bring this about, he has set four goals for technology in schools designed to lead to technological literacy for students, based on what educators, business leaders, parents, and many others have identified as key priorities:
1. All teachers in the nation will have the training and support they need to help students learn using computers and the information superhighway;
2. All teachers and students will have modern multimedia computers in their classrooms;
3. Every classroom will be connected to the information superhighway; and
4. Effective software and on-line learning resources will be an integral part of every school's curriculum.

The National Staff Development Council (NSDC) has established national standards aimed at giving schools, districts and states direction in what constitutes quality staff

development for all educators to address these needs. The standards begin with a call for districts to make a permanent commitment of money and staff time for continuous staff development as an integral part of the system. The standards advocate for staff development that is grounded in solid research — not just to convey the best teaching methods and appropriate curriculum content, but so staff understand the process of change and how to work collaboratively to solve problems and make decisions.

According to the standards, good staff development takes a variety of approaches. Action research, observation and evaluation, study groups or group problem solving, journal writing and other methods are important. In brief, the standards call for:
1. Aligning staff development with school and district goals to improve education;
2. Establishing priorities on what issues to address using student data;
3. Providing follow-up and support;
4. Addressing the need for quality education for all children, regardless of race, ethnic background, gender or special needs through staff development;
5. Emphasizing a challenging, developmentally-appropriate core curriculum based on content and outcomes established by schools, parents and the community; and,
6. Promoting parent and family involvement in education through staff development...and more.

The North Central Regional Educational Laboratory (NCREL) has developed a research-based professional development framework that promotes ongoing professional development and encourages individual reflection and group inquiry into teachers' practice (http://www.ncrel.org/sdrs/areas/issues/educatrs/prodev/pd2fiph.htm). In practice, the five phases overlap, repeat, and often occur simultaneously:
1. Building a Knowledge Base.
2. Observing Models and Examples.
3. Reflecting on Your Practice.
4. Changing Your Practice.
5. Gaining and Sharing Expertise.

V.   Summary

As stated in the report, NE School Technology – Ranked at Top in the Nation, the successful and rapid development of technology in Nebraska's schools show the power of commitment and the power of partnerships with Nebraska's governor, the Legislature, community leaders and educators at all levels. We are achieving our goal: Nebraska is among a handful of states leading the nation in school technology. Now we must work to maintain our lead and to help schools use technology to provide the best possible education for all Nebraska students.

Professional development is a crucial component in the achievement of Nebraska's technology goals. Inadequate staff training will lead to under-utilization of the technology – and a loss of return on our investment.

Ensuring Life-cycle Funding for the Acquisition of Network Hardware and Personal Computers, PreK-16

AWhite Paper written by the
Educational Technology 2010
Life Cycle Funding Follow-up Group

Ensuring Life-Cycle Funding

I. Overview

Teachers are trained, classrooms wired (Category 5 10BaseT cable), computers installed and Internet access (56 KB or T1) is established. But, the critical issue remains. How is the installed based of knowledge (teacher training), hardware, software, network infrastructure, Internet access bandwidth, and teacher training to be kept current?

During the 1990s, Nebraska's educational institutions (K-16) became national leaders in the area of information technology and the deployment of educational computer networks and telecommunications. In order to retain its leadership position and to be competitive in the workplace of 2010, Nebraska's leaders must recognize that all hardware, software, network wiring/products, and Internet access bandwidth have limited life expectancies. Therefore, a plan must be developed for the necessary funding to ensure their replacement on a regularly scheduled basis.

With the rapid change in technology, it is particularly important to fully understand the product life cycle so that the educators can make the best use of the dollars invested in technology. A product's life cycle begins at the point of introduction to the market and continues until the vendor no longer supports the product. This life cycle will vary depending on the type of product.

For example, a computer system's life expectancy is often determined by the amount and speed of innovation incorporated into the product. The life expectancy of a personal computer (PC) is relatively short, since newer technology is being introduced at a rapid pace. It is not uncommon for today's PC vendors to introduce new product or product bundles every two to four months.

In the case of software, the time period is often longer between major versions. Operating systems seem to undergo major revisions every 18 to 24 months. For other applications such as word processors, spreadsheets, etc., product releases/updates occur approximately every six months, and vendor support for older products may terminate with the introduction of the new version of the product. (It is common among personal productivity application software vendors to only support the "current" version of the software.)

Category 5 10BaseT (Cat 5) local area network (LAN) wiring is adapting to the rapid change more easily than many other aspects of technology. According to network engineers at US WEST, LANs should be in an upgrade cycle that results in one-third of the network (other than the wiring) being upgraded every 18-24 months. Currently, Cat 5 wiring is rated for 100-megabit (MB) transmission but has been tested for gigabit. The major upgrades needed in this area are network cards (usually 10 megabit); hubs to switches; switches (from10 MB to 100 MB); and routers supporting the integration of voice, video, and data.

Another issue is the cost of the bandwidth needed to create a statewide network (voice, video, and data). There will be an ever-increasing demand for greater bandwidth and interconnections, as lifelong learners across the state desire to participate in "anytime, anywhere learning."

II.   Recommendations

A. Provide tax incentives for businesses to partner with schools.
B. Encourage funding creativity by providing legislative leadership that demonstrates vision that is based on a cooperative plan for sharing resources between all political subdivisions.
C. Forward fund Rule 88 obligations as outlined [See Appendix F].
D. Expand funding opportunities thereby allowing ESUs to provide regionally based technical training and support for all political subdivisions across the state.
E. Exclude technology expenditures from lids as long as they fall within the scope of the goals and objectives of the NITC.
F. Establish a goal of five students per multimedia, Internet accessible computer.
G. Increase the length of teacher contracts and provide increased funding for in-service and pre-service teachers. Time is an issue for training educators. Different teacher contracts must be developed that will encourage continued learning and development throughout the year. According to David Thornburg (Director of the Thornburg Center and Senior Fellow of the Congressional Institute for the Future), *"Staff development should be moved to the number-one position in any dialog on technology in education, and it needs to focus on the effective use of technology in support of pedagogical and curricular issues appropriate to a redefined concept of schooling needs to be completely overhauled around the new skills that educators will need to operate in an educational setting appropriate to the next century."*
H. Improve access to a statewide network by implementing the prime vendor concept as recommend by the TINA Advisory Group.

III. Nebraska Background

A. K-12 Perspective

K-12 schools in cooperation with the educational service units (ESUs) across Nebraska are currently addressing most of the technological needs of students and teachers. Legislative action in 1992 resulted in the passage of LB 452, which called for ESUs to provide Internet access as well as the training necessary to equip teachers with the skills needed to integrate this new and powerful tool into the curriculum. A second bill (LB 860) passed in 1995, allowed the former weatherization funds to be used to by schools for establishing the initial connection to the Internet as well as the networking of classrooms (for the current status, go to http://www.nde.state.ne.us/TECHCEN/inter/stats.htm).

Although most schools are networked, not all classrooms are equipped with adequate computers that will meet the needs of students. Even though there is an installed based of approximately 70,000 computers, at least one-third of these would not have adequate processing power to run current applications and provide Internet access at a reasonable speed.

The scope of computer upgrade/replacement is enormous. If schools were to place their computers on a seven-year replacement schedule, it would cost $16.8 million per year (20% x 70,000 x $1,200). [Note: This amount does not include any funds for teacher training or upgrades that need to be made to the local area network infrastructure.]

Current sources of funding for technology [See Appendix G]:

  1. Local tax base
  2. Local foundations
  3. State aid
  4. Education Innovation Fund
  5. Rule 88
  6. E-rate
  7. Grants
  8. Hardware/software donations

B. Higher education Perspective

The need for life-cycle funding is as critical for post-secondary institutions as it is for the K-12 sector. Consider the following narratives.

University System:

> *"Expenditures on technology for higher education have traditionally been focused on the initial acquisition cost, rather than the costs of maintaining the technology and updating the technology. The Nebraska higher education community should*

demand a modern IT infrastructure that will help and enable the higher education community achieve a position of leadership, and to assure that sound fiscal planning permits the maintenance of this infrastructure at state-of-the-art levels.

Digital networks, for example, are capital intensive and their various components have widely varying useful lives. Network usage has doubled approximately every year for the last ten years and is expected to continue to increase at this rate as a minimum. As the technology evolves and demand for higher level services increase, the complexity of the network will also increase, as will its support costs. Internet access for example at the University of Nebraska will be jumping from $7,000 a month for a T3 connection to $25,000 a month for the same service in 2001.

It is essential that any effective technology-funding model must scale with growth. During a growth phase, funding must be adequate to cover the substantial investment required for installation of the infrastructure and initial support effort. Once technology stabilizes, financing must cover routine equipment maintenance, equipment replacement, capacity growth, and should plan for contingencies such as dramatic changes in either demand or technology.

The Nebraska higher education community should budget a standard amount per year, per FTE to support life-cycle replacement of faculty and staff desktop computers, and to cover the cost of providing local support to that desktop.

The Nebraska higher education community stock of computers should be systematically modernized so that they are all capable of supporting current releases of widely used software, Web access, and other basic tasks of computation and communication" (Walter Weir, Chief Information Officer, University of Nebraska).

Wayne State College:

"Presently, life-cycle funding does not happen on our campus for just about anything related to technology. We have 900 state-owned desktop PC's that we think are good for three years. Unfortunately one third of them are over four years old. None of them is on maintenance. We have twelve Novell file servers, six NT web servers, and five Linux/Unix servers that serve our campus computing needs. We do manage to keep them current, but only because we build the systems. They are all multi processor systems with RAID and ATM network connection. We build them for one-third the price of purchasing them. Given that we build them, we forego the maintenance option since that is not possible with custom-built systems. We have over twenty buildings attached to our network and many (over half) have eight to ten year old electronics. This is an area that I am increasingly concerned about given that CISCO has indicated that the life of their equipment is three years.

I cannot speak totally for the other state colleges within the Nebraska State College System, but I am confident that life-cycle funding is a non entity. I am equally confident that it is the same for almost all state agencies.

Our campus technology budget is quite austere. This past year I completed a budget request document that included life-cycle funding options. The budget request and funding levels have a disparity of over $400,000" (Dennis Linster, Director of Network Services, Wayne State College).

Central Community College (CCC):

"Currently CCC has no regulated or set plan for replacing computers, but our goal is to replace a computer every three or four years. CCC has over 1500 computers in production. If we are to get into a replacement cycle, the central office would have to allocate those dollars from existing program. Replacing 500 computers/year at $1500 each would cost $750,000" (Jeff Soulliere, Network Administrator, Central Community college-Grand Island).

C.   Statewide Infrastructure

The Technology Infrastructure Needs Assessment (TINA) has clearly documented the need for expanding the means by which connections are made across the state. As a result of this study, the numerous users interviewed expressed five major themes:

1. Affordable, wideband Internet access must be made available in rural Nebraska
2. Greater bandwidth will be needed to satisfy the applications planned for the next five years
3. Basic technical training is needed at all levels on telecommunications systems and features
4. The LATA boundary is a burdensome and artificially imposed cost barrier in Nebraska and must be eliminated
5. The state should enable local exchange carries (LECs) to provide affordable wideband services for rural Nebraskans.

IV.   National Background

The Office of Educational Technology (OET), under the leadership of Linda Roberts, has undertaken a strategic review and revision of the national educational technology plan to be completed by Fall of 2000. The OET has identified five emerging priorities, each of which has a detailed description on the OET website http://www.ed.gov/Technology:

1. All students and teachers will have access to effective information technology in their classrooms, schools, communities, and homes.
2. All teachers will effectively use technology.
3. All students will be technologically literate and responsible cybercitizens.

4. Research, development and evaluation will shape the next generation of technology applications for teaching and learning.
5. Education will drive the E-learning economy.

Innovative funding opportunities are being created across the country. [See Appendix H]

V.   Summary

The need for life-cycle funding is clear. Nebraska is at a crossroads. Now is the time for the people of Nebraska to step forward, to be pioneers in the area of funding for technology in educational institutions. Funding for technology must not be seen simply as the purchase of hardware, software, or network connections. Rather, technology is a gateway to the world, and must be seen as a series of productivity tools that will make Nebraska a formidable player in the global economy.

According to George Gilder in a December 31, 1999, Wall Street Journal article entitled, *The Faith of a Futurist,* the changes to be addressed in this millennium will be phenomenal.

> *"In much the way Albert Einstein's theory of relativity transformed the time-space grid of classical physics at the beginning of the twentieth century, the Einstein's of Internet communications are now transforming the time-space grid of the global economy… The discoveries of the quantum era allowed the manipulation of the inner structure of matter, and unleashed the power of microelectronics to change the inner structure of society…it made cheap personal computers more powerful in impact than the most ambitious supercomputer of a decade before, flinging intelligence to the fringes of all networks, industries, and organizations…In the end, the quantum revolution endowed every teenager at a computer workstation with more potential creative and communications power than a factory tycoon of the industrial era…"*

Using Technology Appropriately to Address the Needs of Diverse Learners

A White Paper written by the
Educational Technology 2010
Learner Needs Follow-up Group

Addressing the Needs of the Learner

I. Overview

The purpose of this paper is to make recommendations that will help implement the Nebraska Information Technology Commission (NITC) Education Council's priority of meeting the needs of diverse learners.

"Hey Mom, you're not gonna believe this, but I am talking to some scientists from NASA that are in Antarctica." Nine year old Betsy, a fourth grader, is experiencing learning in her classroom that was not available to her parents, grandparents, and even her older brothers and sisters. Her teacher is providing her with problem based, collaborative, real world classroom experiences.

Noted educator John Dewey stated, "If we teach today as we taught yesterday, we rob our students of tomorrow." Students entering the work force of today and tomorrow experience a vastly different world than that of their ancestors. The industrial age has transformed into an information age, requiring a very different set of skills.

The manufacturing and farming industries of the early to late 1900's required workers to possess a strong work ethic with good manual labor skills. Employers preferred laborers who could work quietly and independently in repetitive tasks, without differentiating from management direction. The factory model of education, providing students who were sitting in straight rows with lecture, workbook, worksheet instruction worked well to prepare learners for this type of work environment.

Throughout the past several years, the work place has evolved from an industrial setting to an information age. The strong work ethic is still vitally important. Today, employers seek workers who can problem solve, work in collaborative groups, and have the ability to communicate and cooperate. Classrooms of today and the future must provide a different learning environment, encouraging students to communicate, perform at high levels of critical thinking, and work well independently and cooperatively.

Institutions of education can no longer stamp out copies of cloned learners. Educators must create environments that enable individual learners' abilities to emerge. Students in today's classrooms have unlimited learning opportunities which are vastly different from those of their parents and grandparents. Information is exploding. The Internet provides students access to an immense number of resources.   Internalization rather than

memorization of learning has become a necessity, as students prepare for the work force. Nebraska educators must be provided with training and time to develop, deliver, and assess dynamic curriculum focusing on the needs of twenty-first century learners.

II.   Recommendations

A.   Direct school districts to:
· Require all students to meet the Nebraska Student Essential Learnings in Technology
· Require educators to meet the NDE Educator Competencies in Technology for teacher certification and recertification

B.   Direct the Department of Education to:
· Implement certification in Educational Technology
· Implement a teaching endorsement in Educational Technology

C.   Provide students directed learning experiences that:
· Enable students to internalize rather than memorize
· Allow and encourage the learner to ask the meaning for/or application of the content/skills being learned (What's in it for me?)
· Connect to the real world
· Facilitate the true rewards are those from self-satisfaction
· Allow for teaching at the student's development/skill level
· Facilitate learning through the multiple intelligences
· Allow for staff members to collaborate and team teach
· Require the learner to select and use of the appropriate tools

D.   Provide educators with the skills to:
· Design curriculum which will address student learning styles, hemisphericity, multiple intelligences
· Develop and direct cooperative and collaborative learning experiences
· Create learning experiences which allow students choices and ownership in their learning
· Facilitate active student learning rather than passive teacher lecturing to students
· Promote hands-on learning experiences
· Enable students to develop critical thinking and problem solving skills
· Provide opportunities for learners to be active participants in the learning process
· Model effective use of technology

E.   Assist the education community in designing curriculum which will:
· Teach skills that serve as a foundation for lifelong learning
· Integrate learning experiences to allow and facilitate use of multiple curricular areas and skills
· Facilitate critical thinking and problem solving
· Make the learners active participants in the learning process
· Assist the learners to know themselves
· Be open ended and encourage the learner to stretch and grow mentally
· Facilitate learning skills and life skills

E.   Provide accountability for the students by:
· Assessing learning through multiple instruments
· Allowing students to demonstrate the skills and knowledge learned
· Evaluating student effectiveness in team or group settings
· Expecting students to develop portfolios of their performance
· Teaching students to self-assess their performance
F.   Conduct further research into the areas of:
· Brain functionality including learning styles, hemisphericity, and
multiple intelligences
· Impact of technology on teaching and learning

III.   Nebraska Background

The Nebraska Department of Education High Performance Learning model advocates effective schools which provide results based instruction, teaching, and learning. All students are to be provided instruction that is standards based, high quality, and equitable. School districts throughout the state are striving to align district learning objectives with state standards. Assessment models are being developed to authentically assess student learning.

Nebraska Educator Competencies
Educators with the skills outlined in the Nebraska Educator Competencies have the ability to design and deliver instruction which will model and implement technologies in teaching and learning environments. The Educator Competencies align with National Technology Standards for Educators were which were developed by the International Society for Technology in Education (ISTE). The competencies serve the basis for staff development for K-12 districts and a guide for preservice institutions.

Nebraska Student Essential Learnings in Technology
Student skills were identified by a representative K-16 group of educators from across the state in 1999. These skills were presented to the Nebraska State Board of Education as a part of the K-12 State Technology Plan. Nebraska teachers who provide students with integrated curriculum learning opportunities aligned with state standards and student technology competencies are enabling learners to acquire and practice lifelong learning skills.

Statewide Training Opportunities
Educators throughout the state have participated in a variety of statewide training initiatives. These include:
· US WEST Teacher Training
· Challenge Grants
· Rule 88 Internet Training

The US WEST Teacher Training project was multifaceted, teaching classroom teachers how to use technology (specifically the Internet), design project based lessons, and

deliver staff development to fellow teachers. Funded by US WEST, the two year training directly impacted 238 teachers. These teachers were responsible for providing staff development to another 2,380 teachers.

The Challenge grants, including Community Discovered and the Connections Project, have provided many classroom teachers throughout the state with constructivist training. Constructivism is founded on the belief that students learn best through hands-on, discovery-oriented activities. Teachers utilizing this training are developing and delivering instruction, which is cooperative and collaborative, developing students' problem solving and critical thinking skills.

LB860 (Rule 88), passed by the legislature in 1995, provided $50 to each classroom teacher throughout the state for the express purpose of participating in Internet based training. Many teachers across the state have utilized these monies to attend Midwest Internet Institute. Institute sessions are presented by successful classroom teachers and students who shared teaching and learning experiences.

State Conferences
The Nebraska Educational Technology Association (NETA) provides an annual conference that is attended by over 1,500 educators each spring. The Midwest Internet Institute (MII) promotes Internet based learning activities each summer. Educational Service Units host regional Technology Fairs throughout the state each fall and winter.

Each of these conferences provide sessions and workshops conducted by state teachers for their peers. The presenters model best teaching practices, successful project based learning, and student oriented classroom activities.

IV. National Background

Many nationally recognized organizations and institutions have collected and compiled data indicating that work force skills are changing dramatically.

Changing Workforce
U.S. Department of Labor statistics collected in 1996 predicted 45% of all new jobs in the year 2004 will be in industries that did not exist in 1994. The implication is that nearly half of the current sixth grade students in Nebraska schools who will graduate in the year 2006 will move into occupations which are presently unheard of in Nebraska.

(Insert chart here)

U.S. Bureau of Labor Statistics (1998) indicated 65% of the U.S. labor market in the year 2000 will be in the information technology area.

(Insert charts here)

As indicated in the graphs on the right the unskilled labor market is decreasing from 60% in 1950 to 10% in 1997. The professional labor force has increased from 20% to 70%.

This data was obtained from http://www.vpskillsummit.org

(Insert chart here)

Changing Workforce Skills
National Learning Foundation data (1995) indicated current workforce members demonstrate the following characteristics.
- · Operate machinery
- · Work in an autonomous environment
- · Conform to work place expectations

- Punctuality in attendance and project completion
- Accurately replicate manufactured goods
- Ability to follow instructions
- Competitive in nature
- Obedient to management
- Demonstrate endurance
- Reluctance to share new knowledge

The Foundation predicted the following characteristics would be necessary to compete in twenty-first century jobs.
- Life long learning
- Pattern discovering
- Integrity
- Creative
- Digital
- Curious
- Collaborative
- Experimenting
- Team oriented
- Systems thinking

Traditional teaching and learning methodologies will continue to provide students with the skills for the industrial work force.

V.   Summary

Charles Kettering said, "My interest is in the future, because I'm going to spend the rest of my life there." Traditional teaching and learning settings produced learners who were prepared to function in a factory or industrialized work force. New technologies have provided an information based work place. Students graduating from today's schools do not possess the appropriate skills to function at a high level in the information technologies fields. Consequently, many jobs go unfilled, and many of Nebraska's brightest students leave the state for opportunities elsewhere, creating a brain drain in the state. Instruction in Nebraska classrooms must evolve to more adequately prepare learners for the twenty-first century work place.

Coordination of Cross -Agency Planning and Public/Private Partnerships

A White Paper written by the
Educational Technology 2010
Public/Private Partnerships Follow-up Task Group

Coordinating statewide education information technology efforts and resources, including collaboration with public and private entities.

I. Overview

The purpose of this white paper is to provide recommendations regarding coordinating cross-agency planning and encouraging public/private partnerships.   The goal is to prepare Nebraska's youth for the 2010 workforce. It will include recommendations to explore the following areas:

1. Encouraging IT learning opportunities by involving K-20 learners with communities & businesses through school to work, service learning, internships, community learning centers and other career-oriented activities.

2. Creating tax incentive opportunities for businesses that participate in IT development within Nebraska K-12 schools, including providing instruction to teachers and/or students, technical support, software and hardware, facilities, and teaching materials.

3. Encouraging K-20 cooperation and sharing in curriculum development, teacher training, and professional development.

While some coordination of public/private partnerships is occurring, business participation and information technology awareness needs to be increased. In order to help facilitate this, bottom-line results need to be positively effected. Helping businesses and agencies address the labor-availability shortage is one way to achieve business and community support. Getting K- 20 educators and students to show businesses, and each other, what their technology needs are, is another way to help effect change. Instead of IT occurring in isolation, it needs to become all encompassing and seamless between education, business and other community entities.

The key determinant of Nebraska's success will be how we define educational visions, prepare and support teachers, design curriculum, address issues of equity, and respond to the ever-changing technological world.

II.   Recommendations

Over half of the recommendations from the February 2000, Ed Tech 2010 Collaboration with Public and Private Entities Work Group centered on utilizing business experts from the community, to help prepare students. The primary recommendations are:

1. Encourage IT learning opportunities by involving K-20 learners with communities and businesses through school to work, service learning, internships and other career-oriented activities.

There are many ways of enhancing IT learning opportunities in schools.   In elementary and middle schools, career fairs and guest speakers can introduce students to IT careers. In high schools and postsecondary institutions, school to work, service learning, internships, and other career-oriented activities can prepare students for the 2010 workforce.   Of all of these learning opportunities, internships provide students with the greatest workforce experience.   It is suggested that the NITC staff research the costs, benefits, and feasibility of instituting a statewide IT internship and scholarship program. Such a program would have many benefits, including encouraging more students to major in IT related fields at educational institutions in the state, providing students with relevant work experience, improving IT recruitment efforts by businesses in the state, and developing a stronger relationship between IT businesses and educational institutions.

2. Create tax incentive opportunities for businesses that participate in IT development within Nebraska K-12 schools, including providing instruction to teachers and/or students, technical support, software and hardware, facilities, and teaching materials.

Offering tax incentives to businesses would provide an automatic answer to the age-old question, "What's in it for me?" Additionally, schools who provide their facilities and equipment for after-hours community learning centers could take advantage of such tax incentives as well.   Such a tax incentive could be patterned after the Community Development Assistance Act (CDAA) Tax Credit Program.   The program, administered through the Nebraska Department of Economic Development, is designed to encourage businesses to donate money, services or goods to nonprofit community activities in economically distressed areas of the state.

3. Encourage K-20 cooperation and sharing in curriculum development, teacher training, and professional development.

It is recommended that the Education Council encourage collaboration between all K-20 entities.   The NITC Clearinghouse Web site may provide a vehicle for the sharing of information and resources among K-20 institutions.

III. Nebraska Background

There are a number of examples of public and private entities coordinating various levels of education IT efforts and resources in Nebraska. Often these efforts are local and based on single community needs. Included is a list of Nebraska partnership project examples. *This list is in no way intended to be exhaustive.*

Partnerships Between Education & Businesses/Communities

- In August of 1999, The Peter Kiewit Institute of Information Science, Technology and Engineering was developed to build on Nebraska's strengths in information technology, telecommunications and construction engineering, and to expand educational opportunities in the state to address needs of the rapidly growing technology industry. By combining the University of Nebraska at Omaha's new College of Information Science and Technology with the University of Nebraska -- Lincoln's College of Engineering and Technology, which has had a presence on the Omaha campus for decades, in partnership with Nebraska business and industry, the new Institute emerged. From design, to funding, to program and delivery, The Peter Kiewit Institute charts a new course in academic and business partnerships and will provide unique opportunities and curriculum in some of the most sought after fields in the world today.

- In 1987, Lincoln Public Schools and Duncan Aviation implemented the Ventures in Partnership Program in their schools, to increase community involvement in schools. (http://mirror.lps.org/instruction/VIP/) There are now more than 375 partnerships working together to enhance education and build a stronger community, through mentoring, job shadows and other hands-on activities.

- In 1991, the Applied Information Management (AIM) Institute was formed as an outgrowth of a Chamber of Commerce-led initiative. (www.aimlink.org) AIM is a not-for-profit membership organization created by a consortium of business, education and government entities to support and promote business growth related to information technology. The mission of the AIM Institute is to provide information technology leadership to the greater Nebraska community by focusing, coordinating and synergizing the resources of our educational, governmental and private business partners. The Institute continues to focus on emerging technologies and serves as a catalyst for facilitating the changes and improvements necessary to meet the information technology needs of Nebraska communities.

  An AIM Educational IT Consortium, SchooLink, (www.schoolink.org) was formed in August of 1999. 37 School Districts, across the state, participate in the consortium. SchooLink addresses important issues surrounding IT curriculum, career awareness tools for students, the teacher shortage, teacher training, and securing funding. Currently, SchooLink is serving over 160,000 Nebraska K-12 Students and

Educators. Through SchooLink and the AIM Institute, school districts also gain access to over 300 business partners across the state.

- In 1992, Nebraska FUTUREKIDS was established by Area Director, Myrta Hansen. Nebraska FUTUREKIDS currently works with 16 school districts and Educational Service Units 1, 8, 9, 10, 13 and 14. (www.futurekids.com) FUTUREKIDS, a national program, was founded in 1983 with the express purpose of equipping children with the basic computer skills needed to excel in school and in the workplace. In 1989, after testing and refining their Computer Mastery Program, FUTUREKIDS began the process of creating a worldwide network of computer Learning Centers. To date, FUTUREKIDS has operations in over 70 countries and provides computer literacy training in over 2,000 locations.

- School-to-work or school-to-career programs invite business professionals into the classroom to share "real-life" knowledge and experiences with K-12 students. The School-to-Work Opportunities Act (STWOA) was signed into law on May 14, 1994, providing the framework for creating School-to-Work (STW) systems in all states. Nebraska has several strong school-to-work programs across the State. However, grant funding is ending in 2000, and some of the programs are struggling with sustainability issues. The purpose of the STWOA is to offer students accurate career information and opportunities to develop academic and technical skills so they have the qualifications necessary to compete successfully in a rapidly changing global economy. The STWOA is unique in that it is jointly administered by the United States Departments of Labor and Education, providing seed money for technical assistance, system planning, policy development, public relations and marketing, and staff training for states developing comprehensive systems of school-to-work. (http://stc.neded.org/index.html)

- In 1997, the Nebraska US WEST Foundation funded a three year program to help educators throughout the state learn how to integrate telecommunications into the curriculum. Nebraska's US WEST/Nebraska State Education Association (NSEA) Teacher Network Technology Training Program trained about ten percent of all Nebraska K-12 teachers; more than 2,300 educators from private and public K-12 schools, in the use of technology, including the Internet. Funded by a $687,000 grant from the US WEST Foundation, the program represents a partnership with US WEST, the NSEA, the Nebraska Community Foundation and the Nebraska Department of Education.

- The State of Nebraska, through a partnership with Southeast Community College, has developed an information technology retraining program to address its shortage of IT personnel. The Information Technology Retraining Program was part of LB924, passed during the 1998 Legislative session. So far, two classes have completed the six-month intensive training program delivered by Southeast Community College. Over 90% of the trainees have completed the training program. The program's retention rate is also high. Eighty-seven percent of those completing the training program have continued to work for the State of Nebraska. Because the newly

trained IT employees have both a knowledge of state government operations and technical skills, the agencies whose employees have participated in the program have been very satisfied with the performance of the program participants.

- In the fall of 1999, Nebraska established a state chapter of TECH CORPS. TECH CORPS is a national non-profit organization that is funded through corporate contributions and implemented through state chapters.   TECH CORPS' three-prong mission is to recruit, place and support volunteers from the technology community who assist schools with the introduction and use of new technologies; bring additional technology resources to schools and communities through local and national projects; and, build partnerships in support of educational technology among educators, businesses and community members at the local, state and national levels. (http://www.ustc.org/) Hay Springs Schools participated in a Nebraska TECH CORPS pilot project, sponsored by the Intel Corporation. The students received software, a scanner and digital camera from Intel, and they were charged with creating a Living Legacy Web Site about the community's history.

- Papillion LaVista High School, ACI (a technology company) and the Applied Information Management (AIM) Institute have joined together to provide facilities,teacher training and support for a Cisco Networking Academy Program. The Cisco Networking Academy Program teaches students to design, build, and maintain computer networks. The Academy curriculum covers a broad range of topics, from basic networking skills such as pulling cable to more complex concepts such as applying advanced troubleshooting tools. ACI provides one of their employees as a Cisco Networking Teacher and Papillion LaVista High School provides a teacher for the Academy. AIM Institute provides the instructor training and program quality assurance/support. The ACI and Papillion LaVista Instructors team-teach the class at ACI, Monday through Friday at 6:30 AM.

   (http://www.cisco.com/warp/public/779/edu/academy/overview/fast_facts.html)

   There are 43 Cisco Academies in Nebraska, making this one of the most widespread IT training initiatives in the state. [See Appendix I]   Yet, this program is far from being available to every high school student.

Partnerships Among Educational Institutions

- The University of Nebraska was one of thirteen higher education change efforts funded in 1994 by the William K. Kellogg Foundation. Nebraska Network for the 21st Century, or NN21 is a statewide endeavor involving the University of Nebraska, the state colleges, and the community colleges. Through the partnerships fostered by NN21, a number of cooperative projects have been undertaken, including:
  a)   An articulation agreement between the community colleges and the University of Nebraska-Lincoln allowing students to transfer credits
  b)   The Nebraska Distance Education Catalog (http://netdb.unl.edu/distance/), a new Web site containing a listing of all higher education course offerings in Nebraska delivered by distance technology
  c)   A newly formed partnership in the Panhandle for solving telecommunications infrastructure problems in sparsely populated rural areas. Partners include leaders from higher education institutions, business/industry, and government.

  (http://www.unl.edu/nn21/about.html)

- The Connections Project is a cooperative effort between five "lead" Nebraska schools, twelve Nebraska partner schools and five active grant supporters. The program began in the fall of 1996.   It is a five-year challenge grant project, funded by the U.S. Department of Education.   The project provides four major activities to assist teachers, mentors, and community members in enhancing student learning through integrated curricula supported by technology. The activities include professional development for teachers, curriculum development activities, community connections programs, and statewide and national dissemination of 400 project curriculum models and resources through a web site and CD-ROM. (http://ois.unomaha.edu/connections)

  Schools and supporters include: Seward Public Schools; Ainsworth Community Schools; Morrill Public Schools; North Platte Public Schools; Kearney Youth Correctional Facilities; Geneva North High School; Kearney West High School; Omaha NCYF; Mitchell Public Schools; Centennial Public Schools; Burwell Public Schools; Loup City Public Schools; Litchfield Public Schools; Kearney Catholic High School; Paxton Consolidated Schools; Valentine Rural High School; Gibbon Public Schools; Rock County High School; Scottsbluff Public Schools; St. John Lutheran School (Seward); Nebraska Department of Education; University of Nebraska at Omaha; Educational Service Units 6, 10, 16 and 17; Susan Kovalik & Associates; and Indian Center, Inc.

- The Division of Continuing Studies' Department of Distance Education (DDE) helps individual students meet educational needs by extending the resources of the University of Nebraska-Lincoln. The department serves K-12 school districts, alternative and charter schools, home school organizations, community colleges, external degree programs, and universities and colleges throughout the nation as well

as individual students worldwide. The department offers college graduate and undergraduate courses in 26 academic areas, high school credit courses leading to a fully accredited diploma, and professional noncredit programs in such fields as real estate and building inspection. A rich mixture of electronic networks, Internet and the World Wide Web; interactive computer groupware; teleconferencing; video and audiocassettes; CD-ROMs; and print are employed to reach students.

The Division of Continuing Studies' Department of Distance Education http://dcs.unl.edu/disted/ at the University of Nebraska-Lincoln (UNL) was the recipient of $17.5 million in federal funding to develop an on-line high school diploma sequence. Beginning in March 1996, the CLASS™ Project was awarded $2.5 million for proof of concept by the General Services Administration http://www.gsa.gov/. In July 1996, the University of Nebraska-Lincoln's Division of Continuing Studies http://dcs.unl.edu/ was notified that it had been awarded a $15 million U.S. Department of Education Star Schools http://www.ed.gov/prog_info/StarSchools/ grant. This was a five-year grant with first year funding beginning on October 1, 1996. CLASS™ (Communications, Learning and Assessment in a Student-centered System) is a dynamically student-centered learning environment delivered via the World Wide Web. Using innovative technology, the CLASS™ Project maximizes student learning through the use of moving imagery, graphics, sound and text within a seamless navigational system that encourages individualized discovery and learning.

IV. National Background

In 1994 the School-to-Work Opportunities Act was signed into law. It was an invitation to all sectors of a community to work together in new ways to meet shared and individual needs. The act provided seed money to states and local partnerships, challenging them to build upon the good things they have already done in order to create systems that provide experiential learning for all of their students. Federal investment jump-started the process, leveraged other resources, and now, sunsets in 2001.

Nationally, there are also incidences of public and private entities coordinating education IT efforts and resources. Some of the projects are related to the School-to-Work Opportunities Act, and some are not. Some of the notable projects/initiatives are:

▪ The West Linn-Wilsonville School District Community Partnerships Program, near Portland, Oregon, enriches K-12 curriculum by linking teachers and students with the world outside of the classroom. This Program has been around since the Fall of 1994. One 1.0 FTE teacher, the District Partnerships Coordinator, acts as a liaison between the district's 412 classroom teachers and community partners, who are volunteers from business, industry, non-profits, government, and the skilled crafts. The community partners are career professionals or have an avocation in the area, which is being taught in the classroom. (www.wlwv.k12.or.us/partnerships.htm)

- TECH CORPS is a national non-profit organization that is funded through corporate contributions and implemented through state chapters. Gary Beach, Senior Vice President of International Data Group and publisher of CIO Magazine founded it in 1995. TECH CORPS 3-prong mission is to: recruit, place and support volunteers from the technology community who assist schools with the introduction and use of new technologies; bring additional technology resources to schools and communities through local and national projects; and, build partnerships in support of educational technology among educators, businesses and community members at the local, state and national levels.

- During the Summer of 1999, the "Missouri MOUS Initiative," the first statewide effort of its kind in the nation, was launched. Through the MOUS certification program, students and teachers can take online performance-based exams to verify their knowledge and skills in using the various components of Microsoft Office applications. It involves a partnership among local schools, the State of Missouri, Microsoft and Nivo International to raise the computer skills of Missouri teachers, students and workers. More than $1 million in contributions have been made by the private firms and independent courseware vendors- including 10,000 free MOUS exams, software and training materials. (www.dese.state.mo.us/mous/)

- In September 1999, Governor Jim Gilmore challenged Virginia's technology companies to hire 5,000 advanced high school and college students into substantive technology jobs through the Virginia Technology Internship Program. The three-year, 3.8 million-dollar program will include tax incentives to both students and businesses in the first two years and only to the students in the final year. This program will provide a significant influx of experienced and committed technology workers into Virginia's technology workforce. The number of information technology job vacancies in Virginia is estimated at between 23,000 to 30,000 workers. Although the Virginia Senate did not support the initiative, the Virginia Technology Internship Program can still serve as a model for Nebraska and other states. (www.state.va.us/govenor/newsre/tech0901.htm)

These Nebraska and national examples illustrate that while some coordination of public/private partnerships are occurring, business participation, K-20 information and resource sharing and information technology awareness needs to be increased. In order to help facilitate this, bottom-line results need to be positively effected. Helping businesses and agencies address the labor-availability shortage is one way to achieve business and community support. Getting K-20 educators and students to show each other and businesses what their IT training and software/hardware needs are, is another way to help effect change. Instead of IT occurring in isolation, it needs to become all encompassing and seamless between education, business and other community entities.

V. Summary

Visions of the future vary widely. Most visions feature more collaborative work, both face to face and online, more global connections, richer learning resources than traditional textbooks, and more inquiry, interdisciplinary, and project-based learning.

It is our hope that tax incentive opportunities for businesses will be created to encourage participation in improving IT development in Nebraska K-12 schools and that learners will be encouraged to share and embrace IT learning opportunities in their communities.

The key determinant of Nebraska's success will be how we define educational visions, prepare and support teachers, design curriculum, address issues of equity, and respond to the ever-changing technological world.

Implementing Leading Edge Technology Applications in K-12 and Higher Education

A White Paper written by the
**Educational Technology 2010
Leading Edge Technology Follow-up Focus Group**

Pursuing Leading Edge Technology Applications

I.   Overview

The purpose of this paper is to make recommendations that will help implement the Nebraska Information Technology Commission (NITC) Education Council's priority on pursuing leading edge technology. This document will provide insight into possible ways to improve and increase the implementation of leading edge technology into the classrooms of Nebraska's educational institutions. Although it is difficult to predict the future, certain trends are evident and therefore the goal of the recommendations in this white paper is to help keep Nebraska at the top of the nation in technology and utilization that supports sound educational practices.

This paper will include the following observations:

- Nebraska has been a leader in educational technology, but it is no longer an exclusive club. Other states are equal or ahead of Nebraska in many areas.

- A lack of sufficient numbers of quality technically trained people is hindering advances in education as well as the private sector. The "brain drain" is a contributor to this situation.

- Lack of sufficient access to modern connectivity is hampering efforts to implement leading edge technology across the state in our schools.

- The Nebraska Information Technology Commission and the Educational Service Units are leading agencies pursuing educational technology advancements across Nebraska.

- Educational institutions and educators are struggling to balance the "teaching as I was taught" concept with the implementation of technology innovations that offer the ability to improve our educational outcomes.

and will make the following recommendations for improvement:

1   The State Department of Education, in concert with local school districts and Colleges of Education, should be directed to conduct a review of all current policies that impact technology in education such as certification, accreditation, budgeting, and graduation requirements; and after this review, to remove those barriers found to inhibit the implementation of the best use of technology in learning.

2   30% of technology budgets should be allocated to teacher training/ staff development. Without adequate training, purchases of hardware are not efficiently utilized. With increased training will come an increased eagerness on the part of educators to utilize new innovations in their classrooms.

3   All education instructional staff members will meet the Nebraska Department of Education Technology Competencies established by the Nebraska Department of Education in order to obtain certification/ recertification of their teaching certificates.

4   Provide increased funding to retain the best in education. Many schools are not able to staff their technology positions. Additional funding will be required if we are to have available to schools, not only the hardware but, the personnel necessary to encourage the use of and incorporate leading edge technology in with the existing technology of each school.

5   The concept of "Personal Telecommunications" will continue to thrive and evolve. The Nebraska Department of Communications should develop and promote a detailed plan, partnering with other state and private providers, to provide all learners with 24/7 (24 hours a day, 7 days a week) access to appropriate educational interactive resources of the world, postalized (same price regardless of distance) for all at a reasonable cost, including two-way audio and video connectivity.

II.   Recommendations

This focus group considered the following question:

"In what ways might we improve the implementation of Leading Edge Technology into the classrooms of Nebraska's educational institutions?"

It is the general belief of this focus group that in order for leading edge technology to be implemented, staff members must feel capable, both in ability and access, of utilizing current technology. All the recommendations reflect this central theme to adequate training and access in order to promote leading edge technology applications in Nebraska's educational classrooms.

In order to promote and facilitate the implementation of leading edge technology into Nebraska's classrooms this task force recommends occur:

1. The State Department of Education, in concert with local school districts and Colleges of Education, should be directed to conduct a review of all current policies that impact technology in education such as certification, accreditation, budgeting, and graduation requirements; and after this review, to remove those barriers found to inhibit the implementation of the best use of technology in learning.

    Fiscal Impact Considerations: Minimal cost

2. 30% of technology budgets should be allocated to teacher training/ staff development.

    Rationale: This recommendation is consistent with recommendations made by nationally recognized futurists and technologists. Without adequate training, purchases of hardware are not efficiently utilized. With increased funding and training availability will come an enlarged trained user base, who will better utilize current technology, as well as desire and promote increased utilization of current and future technology applications in our schools.

    Fiscal Impact Considerations: This recommendation does not necessarily mandate increased expenditures, only a shift in allocation to areas of training. Salaries of presenters and training attendees, training materials costs, and workshop expenses are all allowable expenditures under this recommendation. With increased training we feel there will be more efficient utilization of technology with a corresponding or even an increased amount of effectiveness and output being achieved.

3. All educational staff members will meet the Nebraska Department of Education Technology Competencies established by the Nebraska Department of Education in order to obtain certification/recertification of their teaching certificates. The Nebraska Department of Education could administer this requirement, which could also include training and research on software evaluation.

    Rationale: Nebraska should partially base school accreditation on teacher technology certifications. The highest quality schools are those with quality trained teachers. Passing competencies tests ensures the teachers have the skills needed to teach effectively with technology in the 21st century.

    Fiscal Impact Considerations: 30% of technology budget should be used toward teacher training/ staff development. Adequate training to meet this certification/accreditation recommendation should occur within this amount.

4. The Legislature and local subdivisions governing boards should allow for and increase funding to retain the best in education.

    Rationale: We need skilled personnel to operate and maintain technology and train learners. We are losing skilled personnel to the private sector and other states.

    Fiscal Impact Considerations: Up front costs could be considerable, but the cost of doing nothing will be much greater.

5. The Nebraska Department of Communications should develop and promote a detailed plan, partnering with other state and private providers, to provide all learners with 24/7 access to appropriate educational interactive resources of the world, postalized for all at a reasonable cost, including two-way audio and video connectivity.

    Rationale: This recommendation will enhance learning and will also be a major means of retaining current business activities, attracting additional business activity, and retaining our youth within our state. This recommendation will enhance students' opportunity to be successful and happy adults-in Nebraska. The theory of a postage stamp rate for service will help equalize the opportunities for all.

    Financial Impact Considerations: Private companies have and will provide fiber and wireless technology at a minimal acceptable cost if all elements of a community (medicine, government, business, education) share these resources.

Note: Send/receive personal technology units are being developed and are projected to be in the price range of $100-$300. These will be used for several years because the software and many peripherals will be networked

III. Nebraska Background

What is happening in Nebraska now relating to the implementation of leading edge technology in our educational institutions?

Nebraska has been committed to a high level of technology utilization in education. Two of the Nebraska State Board of Education's objectives written in 1996:
1. Assure that all students have access to quality learning experiences using modern technologies in their learning environments.
2. Provide staff members with easy access to technology, ongoing staff development and training opportunities in the effective use of technology in learning.

1. Virtually all Nebraska schools have Internet connectivity. 1997-1998 Education Week studies showed that 84% of Nebraska schools had Internet access compared to a national average of 70%. We can expect an even larger percentage have access today.

2. Economic development in Nebraska is being hindered by an inadequate technology infrastructure. The perception exists that the bandwidth does not exist or is too expensive for large companies to relocate to or to stay in Nebraska; workers with sufficient technology skills are in short supply; technology workers want to live where schools and communities are technologically aware. Many schools and communities in Nebraska do not meet those criteria.

3. Beginning in 1993 with LB 452 and later with LB 860, the Nebraska legislature recognized a need and provided funding and support via the ESU's to wire the schools of the state. As a result Nebraska jumped to the top of lists that audit connectivity as a measure of progress. Since then other states have used superior resources and commitment to wire their states and whoever does it last has the best. It is now also necessary to move to leadership in the category of "best use". Will Nebraska be up to the task?

4. Computer student ratios are misleading or inaccurate because many schools will take into account outdated computers giving false impressions. For example the counting of PC 386, 486, or Apple IIe computers is not equivalent to modern multimedia machines.

5. Nebraska has a variety of levels in the quantity and quality of technology and connectivity in its K-12 schools. Connectivity varies from dial up modems to T-1 speed and bandwidth. A number of schools have no connection with a distance learning pod, while others K-12 pods have the newest mpeg technology available.

6. Distance learning pods—new and old pods are not connected.

7. We only have 7 pods and though they were not originally created to connect with all others, it now would be a nice asset. Now we reach the problem of those schools who were connected 1st and who have maintained equipment needing to replace equipment. Money is not available to maintain older equipment and often the equipment is not even repairable. Some of the distance learning pods have newer equipment and they are not compatible with other older pods.

8. Educational Service Units have been initiators of technology in K-12 education for many years. They were given the responsibility of connecting K-12 schools across the state to a statewide network. This network has been used as a good example of technology across the nation. Due to bandwidth limitations and cost issues, the network as it stands is no longer fulfilling the needs of education.

ESUs have been promoters of technology integration in the classroom and have seen various levels of success, depending upon the adoption level of technology in the districts, administrative support and staff development opportunities. The ESUs appear anxious to assist schools in furthering their access and utilization of technology to promote effective teaching practices.

9. The "Brain Drain" is affecting the desire of schools to be innovative. Schools are hesitant to train individuals, then to have them leave for higher paying jobs in the private sector. And as the discrepancy in teacher's salaries continues to lag further behind other states, and the private sector, innovative and well-trained teacher candidates will continue to migrate elsewhere.

10. Nebraska has done an excellent job of providing nearly 100% Internet connectivity for K-12 schools. Individual school buildings have utilized USF funds and Rule 88 funding to bring connection directly to the classroom. The state now has the challenge of improving this network to support the high bandwidth applications being developed such as for video streaming and desktop video.

11. The establishment of the NITC and its sub-committees is a positive step on the part of the state government in an effort to plan, coordinate, and share technology resources in Nebraska. We hope that NITC can move quickly to keep up with technology changes. A permanent technology liaison staff will be needed to stay on top of changes and to continually update recommendations. The representation of this committee and sub-committees need to represent all sectors of Nebraska and Nebraska education.

IV.   National Background

What is going on around the country?

From the U.S. Department of Education Annual Plan for FY01 [See Appendix J] we read:

National Concerns. Research has found that educational technology, when used effectively, can significantly improve teaching and learning. To support schools in incorporating technology into their curricula, the President has established the four pillars of the Educational Technology Literacy Challenge:

1. All teachers in the Nation will have the training and support they need to help students learn using computers and the Internet.
2. All teachers and students will have modern multimedia computers in their classrooms.
3. Every classroom will be connected to the Internet.
4. Effective software and online learning resources will be an integral part of every school's curricula.

The educational resources of the Internet are growing rapidly. However, many students and teachers, especially those in high-poverty or rural schools, have limited access to these resources.

> http://www.ed.gov/pubs/AnnualPlan2001/Obj1-7.doc
> http://www.ed.gov/Technology/goals.html
> http://www.ed.gov/pubs/AnnualPlan2001/086-red.doc

1. Educators are using artificial intelligence concepts, often used in industry, and pedagogical concepts to enhance computer based and computer aided instruction programs.

Using Artificial Intelligence and intelligent tutoring systems have been shown to be highly effective at increasing students' performance and motivation.
http://www.acm.org/crossroads/xrds3-1/aied.html

2. Businesses are making direct contact with teachers and homes and can assist or disrupt the school's agenda. This is a loss of control by institutions in favor of consumerism (learners make the choices.). The business may desire to: teach students; market their product; support and train for their products; link their products and services to school materials/resources; gain users to sell advertising. Schools are making hard choices of maintaining control vs. obtaining additional resources, especially funding and hardware resources.

3. Internet II growing in size, use and popularity.

   I2 is a collaborative effort by over 100 U.S. research universities, devoted to creating the broadband applications, engineering, and network management tools to enable further scientific and academic collaboration over a second-generation Internet.

   Despite advances in Internet 2, access to adequate bandwidth is a major problem in Nebraska and Nationally. In order for leading edge applications, such as video on demand, digital libraries, and or desktop video to be implemented, increased bandwidth is necessary. A major challenge will be assuring equity between rural and urban areas.

4. Teachers usually teach as they have been taught. At the college level they may be exposed to a great deal of traditional lectures. When they student teach, they usually are monitored by a teacher with a lot of experience, but not much background using technology. They will tend to use technology to do the instructional activities they were trained to do. If this cycle is to be changed, teachers in training should have a model other than the traditional lecture and student teaching under mentors using technology in new, creative, and effective ways. Inservice teachers need access to extensive professional development programs to see the benefit of changing old habits.

5. School Improvement is tied to technology which is tied to staff development. Nationwide I believe we know that in order to use technology effectively, we must train our teachers. It is being promoted that we should spend 30% of the technology budget on staff development training. We spend years teaching our students to use a 50-cent pencil as a tool. We need to teach our teachers how to effectively use the machine as a tool, so they can teach our students. Some schools are able to complete effective training on their own; others outsource to companies like Jostens, CCC, and Future Kids. There are many good programs available so good training is out there should be no excuses not to have training.

6. Communication skills are being required and stressed as an integral part of technology. As technology use becomes more a part of everyday communication certain skills (writing, video production, email, audio production) take on added importance because of the inability of people to use the clues we are used to in face to face meetings.

7. Schools are realizing the effective integration of technology and curricula is highly dependent on staff development. As a result schools around the nation are developing a greater variety of staff development delivery methods relating to the use of technology in schools. These include self-paced training, web based training and distance education.

8. Policies in education have changed due to technology's infusion in modern society. For instance, colleges and universities have had to take a look at the "Carnegie Unit". What does this mean in relationship to distance education? Schools are currently forming network policies that have to be changed year to year. Schools start out with a strict policy about what computers can be connected to the network. They are soon dealing with the idea of students and staff being able to connect to the network at will with their personal computers. Flexibility is the key.

9. There is a lack of time to take advantage of assistance available. Schools and staff are so busy with state mandates and day to day activities that they don't have time to avail themselves of training that is available. Another problem with this becomes that there are so many expectations in schools today that staff can not take advantage of the opportunities they are interested in. More time on staff is needed to accommodate the necessary training.

10. Distance learning utilization will continue to grow nationally. Economic factors will be the major force in causing the growth to increase. As more schools gain access and bandwidth improves, more growth will be seen.

11. Partnerships are being developed for Learning Anytime Anywhere. One of the goals of the U.S. Department of Education's 2001 Annual Plan is "To expand access to postsecondary education and lifelong learning through the

use of technology to all citizens who are unable to take advantage of on-campus programs".   http://www.ed.gov/pubs/AnnualPlan2001/086-red.doc

Additional view:
Vice President Al Gore, speaking to communications industry leaders, January 11, 1994 made the following observations:

http://nii.nist.gov/pubs/sp857/education.html

"The way Americans teach, learn, transmit and access information remains largely unchanged from a century ago."

Schoolteachers work largely in isolation from their peers. Teachers interact with their colleagues only for a few moments each day. Most other professionals collaborate, exchange information and develop new skills on a daily basis.

"U.S. schooling is a conservative institution, which adopts new practice and technology slowly. Highly regulated and financed from a limited revenue base, schools serve many educational and social purposes, subject to local consent. The use of computer technology, with its demands on teacher professional development, physical space, time in the instructional day, and budget ... has found a place in classroom practice and school organization slowly and tentatively."

V.   Summary

Nebraska is recognized as a leader in technology innovations. We believe the majority of Nebraskans would like Nebraska to keep this recognition in its educational and economic future.

This Leading Edge Technology Focus Group believes a required teacher competency in technology is as important as competency to teach reading or mathematics. Each is important to function in a technological literate society. Access to the appropriate technology and training for educators to effectively utilize this technology in the classroom came to the forefront of all our discussions. Funding needs to be increased, but with a cooperative view to statewide needs, an acceptable level of funding should be found. Policies need to be reviewed to see what indirect barriers to technological implementations exist and then remove them. And finally, this task force believes that telecommunications will in the future only become more personal. We recommend a detailed plan begin to be developed to provide all learners with 24/7 access to appropriate educational interactive resources at a reasonable postalized cost for all.

Appendix A

Educational Technology 2010 Conference
185 invitees representing the following communities of interest

Applied Information Management (AIM) Institute
      AIM School-to-Work Initiative
      AIM Technical Preparation Initiative
Congressional Delegation
Dept of Administrative Services
      Budget
      Communications
Dept of Economic Development
Nebraska Dept of Education
      Commissioner
      Board of Education
      Educational Technology Consortium
      Technology Resource Center
      Subject Area Consultants
Educational Service Units
Excellence in Education Council
Greater Nebraska Schools Association
Legislature
      Education Committee
      Transportation Committee
      Appropriations Committee
      Senator Aguilar-Host Senator
Nebraska Association of School Boards
Nebraska Association of Colleges of Teacher Education
Nebraska Library Commission
Nebraska Educational Media Association
Nebraska Educational Technology Association
Nebraska Information Technology Commission
      Commissioners
      Education Council
      Community Council
      Government Council
Nebraska Rural Community Schools Association
Nebraska State Education Association
Policy Research Office
Public Service Commission

Appendix B

Educational Technology 2010 Conference Participants
http://www.gi.k12.ne.us/EdTech2010/edtech2010-participants.htm

Appendix C

Sector priorities of the NITC Education Council

The sector priorities of the Education Council of the Nebraska Information Technology Commission are to provide recommendations that support:

Providing an infrastructure that will permit all citizens of Nebraska to have access to the same educational experiences, regardless of location;

Identifying and facilitating diverse training opportunities;

Ensuring life cycle funding;

Addressing the needs of the learner;

Coordinating statewide education I.T. efforts and resources, including collaboration with public and private entities;

Pursuing leading edge technology applications.

Appendix D

Focus Group Facilitators

Infrastructure:
Wayne Fisher, Internet Specialist, Department of Education Technology Center

Diverse Training Opportunities:
Sue Oppliger, Program Coordinator, ESU 7

Life Cycle Funding:
Alan Wibbels, Media Director, ESU 10

Needs of the Learner:
Sue Burch, Technology Director, Grand Island Public Schools

Public/Private Partnerships:
Cindy Grady, Schoollink Coordinator, AIM Institute

Leading Edge Technology Applications:
Bob Hays, Program Coordinator, ESU 11

Appendix E

TINA Advisory Group Recommendations

The Telecommunications Infrastructure Needs Assessment (TINA) Advisory Committee has reviewed the Telecommunications Infrastructure Plan (TIP) as presented by Federal Engineering. It is the recommendation of the TINA Advisory Committee that the State move forward on pursuing the "prime contractor" alternative for implementation.

The prime contractor concept is defined as the State contracting to lease services under a competitive procurement from a single statewide prime telecommunications service provider. This service provider would offer telecommunications services (i.e.; voice, data, video distribution, video conferencing, distance learning and Internet access) to all levels of state and local government, including K-12, post-secondary and higher education. Service Level Agreements (SLA) and performance parameters such as Quality of Service (QoS), circuit availability, and lead times for service implementation, among others, would be defined. The prime contractor will be expected provide end-to-end services through subcontracting or joint ventures with the incumbent local exchange carriers (ILEC), competitive local exchange carriers (CLEC), Interexchange carriers (IXC), and any other telecommunications service providers as allowed by law. These services will be offered at a uniform postalized rate, with the prime contractor having the responsibility for averaging costs among its subcontractors/partners.

This scenario enables the local exchange carriers (LEC), Interexchange carriers (IXC), Internet service providers (ISP), as well as other telecommunications providers the opportunity to provision for the full range of needed services and be capable of offering services locally to the residents and business interests in each community.

The TINA Advisory Committee has committed to assisting with the implementation of this plan. The Committee's continued monitoring of the process to implement this plan will include periodic analysis of direction and monitoring of the process to ensure the continued integrity of the State network.

The following organizations have endorsed this recommendation

NITC Technical Panel
NITC Community Council
NITC State Government Council
NITC Education Council
Telehealth Subcommittee of the NITC Community Council

Endorsed by the Nebraska Information Technology Commission on April 20, 2000.

Appendix F

RULE 88 FORWARD FUNDING PROPOSAL

Action:
Allocate resources to expedite the implementation of Rule 88 (LB 860) reimbursements.

Sponsoring Entity:
Nebraska Educational Technology Consortium, on behalf of K-12 school systems

Goals and Objectives:
The goal of this proposal is to fund the current and future deficits of Rule 88 (LB860) monies allocated to school districts throughout the state of Nebraska. Forward funding is needed to enable Rule 88 (LB860) implementation in a timely manner.

This supports the following goal of the NITC statewide technology plan.

To broaden educational opportunities, to include expanded access to lifelong educational and training opportunities so that Nebraska citizens and workforce can prosper in the emerging information society.

Justification/Rationale:
The original Rule 88 (LB860) legislation earmarked $13,000,000 for establishing Internet connections, wiring buildings, and enhancing or upgrading Internet hardware, including computers. A staff development component was also included; allocating $50 per classroom teacher for Internet related training.

Rule 88 (LB860) monies were generated from repayments of the former school weatherization loan program. These monies are slated to be repaid to the state over a fifteen-year period, with eleven years remaining in the loan repayment period.

While the Rule 88 (LB860) project appears to be ahead of schedule and under budget, it is currently at a standstill. Schools have been approved for funding, but because there is such a long waiting period for reimbursement, they are not making expenditures and requesting reimbursement. Therefore, the program is not moving forward. If this continues, Nebraska is in jeopardy of falling behind in providing optimal educational opportunities for students.

- School districts are not upgrading hardware due to the delay in funding reimbursement.
- Classroom teachers are not encouraged to participate in Internet related staff development opportunities due to delayed access to Rule 88 (LB860) funds.

- When schools are building additions and new buildings, they are not able to utilize Rule 88 (LB860) funds, therefore they must rely on other tax dollars to support network wiring.

Technology investments in general are hampered by lack of school district reimbursement.
The present status of Rule 88 (LB860) funding is as follows:
- The amount which was allocated for Rule 88 (LB860) funding was $13,000,000.
- Schools have submitted proposals and been approved for expenditures totaling $11,600,000.
- School districts have submitted expenditure requests for $6,500,000 of the $11,600,000, which have been reimbursed.
- Over $1,600,000 of the $11,600,000 in school district expenditure requests are waiting for reimbursement. These schools may be waiting for 3-11 years for reimbursement.
- Approximately $3,500,000 of the $11,600,000 in requests have been approved, but not expended. These school districts are not making purchases due to the delay in funding reimbursement.
- Nearly $1,400,000 of the allocated $13,000,000, has not been requested by schools. The observation is that school districts are not applying for Rule 88 monies due to the likely 11-year delay in the reimbursement process.

If Rule 88 (LB860) monies are not forward funded, Nebraska schools and students are in jeopardy of falling behind other states in the nation.

Work Plan:

- Notify schools whom are waiting for reimbursement – July 2000
- Notify schools who have been approved for expenditures, but have not submitted reimbursement requests– July 2000
- Notify schools who have not submitted a Rule 88 (LB 860) proposal – August 2000
- Begin reimbursement process – September 2000

Required Resources:
Wayne Fisher from the Nebraska Department of Education Technology Resource Center is the coordinator of the Rule 88 (LB 860) program.

Estimated Costs:

The actual cost of this proposal is $6,500,000. Future weatherization loan repayments in the amount of $8,000,000 will replenish the funding source.

  $13,000,000 budgeted for Rule 88 (LB860)

$11,000,000 approved for expenditure
$5,000,000 expended and reimbursed
$5,000,000* expended, waiting for reimbursement
$1,000,000* approved, but not expended
$2,000,000* allocated, but not requested by schools
$13,000,000

*Totaling $6,500,000

Report updated as of 6-28-2000 by Wayne Fisher

Appendix G

SELECTED FUNDING SOURCES
FOR
EDUCATION TECHNOLOGY IN NEBRASKA IMPACTING PreK-12
SCHOOLS

Compiled December 1996, Revised January 1998, April 2000

Dr. Dean Bergman, Nebraska Department of Education

A list of many of the funding sources including a short description, intended purpose, contact person and the approximate amount contributed to the development of education related technology in Nebraska preK-12 schools. The list presented below is not all-inclusive, and is vulnerable to be amended as often as additional information becomes available. Also, the list does not include financial resources contributed by local schools and regional service agencies.

STATE FUNDING SOURCES

Education Internet System- the Nebraska Unicameral passed legislation in 1993 (sec. 79-2225) authorizing ESUs to levy up to one half cent on each one hundred dollars of their valuation. Revenue from the levy was to be committed to purchasing the equipment to put in place the infrastructure for our Internet System and to train school personnel in its use. A frame relay system is now in place through a cooperative effort among the Nebraska Department of Administrative Services, Communications Division, all the Nebraska telephone companies, the Nebraska Department of Education and the educational service units, with the ESUs serving as the connecting nodes for all school districts.

 A portion of the revenue collected has been used for the employment of a technology services staff person and for training of teachers on the use of computers and their application to the Internet system. The amount of money collected by all the ESUs for the 1993-94 school year was $919,240 and for the 1994-95 school year was $3,810,326 from this levy, and a similar amount was generated from this levy for the 1995-96 and 1997-98 schools years, all of which has been used for Internet infrastructure development and staff training activities. Subsequent to 1997-98 the half-cent levy was removed and the Core Services Fund for educational service units took over. This Fund is discussed below.   For information contact Wayne Fisher, Nebraska Department of Education, (402) 471-2085

Core Services Fund for Educational Service Units- The Nebraska Unicameral in 1997 created the first of two state aid packages for ESUs to be distributed on a per

pupil served basis. This aid package was designed to replace the three-cent levy lost by legislative action that would disappear in 1998. The total amount allotted was $ 9,681,922 of which $7,958,967 was for a staff development and technology training fund and $ 1,541,462 was for an instructional materials fund.

In 1998, the Nebraska Unicameral created the second part of the core services state aid package for ESUs. This one added an additional 3 million dollars "earmarked" specifically for technology infrastructure and training. The distribution formula remained the same as in the first state aid package. This brought the total core services fund annual allotment to just over 12.6 million and is anticipated that this total will remain fairly constant in future years. For additional information contact Russ Inbody, Nebraska Department of Education, (402) 471-4320.

School Technology Fund- the State Legislature took action in 1995 to create the School Technology Fund. During the mid 1980's the Nebraska Unicameral appropriated loan money for preK-12 schools to conduct energy audits and pay for energy conservation projects on their buildings. The loan money is now being paid back to the state treasury and will continue for 13 years after 1995. The legislative action taken in 1995 converted this returning weatherization loan fund money to the School Technology Fund to be distributed to schools as grants under State Statute Section 79-4,248. The primary focus of the money was to insure that all schools were connected to the Internet and had funds for the installation of their local area networks. Some money was also "earmarked" for staff development and training related to technology.   This statute charged the Nebraska Department of Education with developing regulations that described the process for distributing the noncompetitive grant funds. Rule 88 is now in place to provide schools with the application and money distribution process. During the 1996-97 school year approximately 2.4 million was granted to schools. It is anticipated that an additional 11 million will be distributed over the remaining years of the grant. Of this amount $50.00 per teacher is specified for training teachers, and must be matched at the local district level with another $50.00 per teacher. Over the duration of the grant project it is estimated that approximately $1,800,000 will go for teacher staff development, based on the 50/50 match, and the remainder will be applied to the Internet infrastructure system. It is anticipated that all schools wishing to do so will be direct connected to the Internet by the end of the 1997-98 school year. For information contact Wayne Fisher, Nebraska Department of Education, (402) 471-2085.

Education Innovation Fund-The Nebraska Unicameral passed a lottery bill in February of 1993 (State Statute, Section 9-812). It specifies that 25% of lottery proceeds be set aside for innovative educational and environmental projects in Nebraska as well as for compulsive gamblers' assistance. Of these proceeds, 49.5 % is specifically targeted for the Education Innovation Fund. An Excellence in Education Council, appointed by the governor, is responsible for developing policies and procedures for the administration of the fund. Two types of incentive competitive grants are available, each with a different focus. Mini-grants provide

resources to public school districts for the sole purpose of developing or revising a district-wide strategic school improvement plan.

Major competitive grants actualize the strategic school planning process by funding innovative programs or practices that address needs identified in the public school district's planning process. The major competitive grants have contributed a sizable portion to schools for technology. Part of the $23,403,890.07 granted to schools from 1994 through 1996 was applied to technology related expenditures such as hardware, software, networking and staff development. The amount "earmarked" for technology infrastructure and staff development has declined in subsequent years. For information contact Joel Scherling, Nebraska Department of Education, (402) 471-0947.

NEB*SAT Grants to Schools- Nebraska legislative appropriations have been made since 1988 to fund NEB*SAT grants to public elementary and secondary schools post secondary institutions and Educational Service Units. The NEB*SAT Coordinating Council, a subcommittee of the Education Council of the Nebraska Information Technology Commission, oversees the development and usage of this competitive grant program. Approximately $110,000 per year is available for applicants interested in applying up to $10,000 per grant. The purpose of these competitive grants is to fund staff development and training in technology.

Another component of this program was devoted to the development of technology infrastructure. Again, this component involved the competitive application process with no ceiling on the amount requested. During the 1996-97 fiscal year $618,000 was committed to serve as match funding for the development of interactive distance learning among multi-school district pods or consortiums. This part of the fund was severely diminished in amount for the 1997-99 budget cycle and has subsequently been discontinued. For information contact Gwen Nugent, Nebraska Educational Telecommunications, (402) 472-9333 ex 326.

FEDERAL FUNDING SOURCES

Challenge Grant for Technology in Education: The Community Discovered-In 1995 the Westside School District in Omaha Nebraska received a five-year grant award in the amount of $5,995,684. Its purpose is to integrate art and technology in K-12 education by using a multi-element education program that uses technology to bring art museums and other educational resources to classrooms in Nebraska and 10 other states. The program targets more than 40,000 students in rural and urban settings. For information contact Ron Abdouch, Project Director. (402) 390-8322

Challenge Grant for Technology in Education: Connections: Strengthening Learning Through Technology-Based Integrated Curriculum and Professional Development. In 1996, the Seward Public School District received a challenge

grant in the amount of $4,400,000. The purpose is to enable middle -school and secondary school teachers in Nebraska to create and implement integrated curricula supported by technology. The project will increase the capacity of educators to teach effectively through integrated curriculum reflecting Nebraska and Goals 2000. A cadre of 600 teachers will be trained to assist colleagues in effective use of technology to improve the achievement of high-risk students in core academic subjects. Nebraska's extensive telecommunications networks, and established Internet hub sites, will be used to create a statewide learning community of middle and secondary school teachers. A total of 30 consortium partners will contribute to this work. For information contact Larry Bundy, Project Director, Nebraska Department of Education, (402) 471- 2183.

Challenge Grant for Technology in Education: Foreign Language Distance Learning Project- In 1997, Educational Service Unit # 5 in Beatrice received a challenge grant in the amount of approximately $6,000,000. This grant will enable Nebraska and Iowa to cooperate in a shared vision for school improvement through curriculum and technology integration. Foreign language was chosen as the lead subject in this study because it presents the greatest challenge among disciplines for implementing higher standards in learning. A variety of technologies, ranging from sophisticated emerging concepts to inexpensive but highly effective ones, will be used to facilitate student learning and to provide professional development opportunities for teachers. Telecommunications using fiber optic and satellite-based systems will connect disparate sites. The project will encourage direct Internet connectivity for many learning applications using multimedia-ready computers. These will include student-made home pages, dual-language portfolios for student assessment, video-on-demand, and correspondence with electronic pen pals. For more information contact Marie Trayer, Project Director at (402) 597-4800, ESU # 3 Omaha, Nebraska.

Rural Utilities Service (RUS) Grants- Funded through the U.S. Department of Agriculture, grants are available to school districts and consortiums of school districts located in communities located in rural settings. Money is "earmarked" for both telemedicine and education technology- distance education projects. It is intended to help perpetuate the survival of rural communities by providing them the opportunities and services delivered electronically. The grants are competitive and successful recipients of the money must apply it to classroom equipment, connectivity, engineering and staff development and training.

 During the 1993-94 funding cycle 17 grants were awarded nationally, each a maximum of $480,000. One consortium of Nebraska schools associated with the educational service units located in Trenton and Ogallala received one grant. In the 1994-95 funding cycle a maximum of $350,000 was funded per grant, and a consortium of schools in northeast Nebraska associated with the Neligh and Wakefield educational service units received one grant. Both of these grants were applied to other funding to establish multi-school district interactive distance

learning pods. Contact person, Allen Nuce, U.S. Department of Agriculture, (202) 720-2321.

Technology Literacy Challenge Fund- Funded under Title I, Part A of the Improving America's School Act, this grant money to states is be available to local school districts, consortiums of school districts and educational service units on a competitive basis. Approximately $8,000,000 is available to applicants over a five-year period (1998-2003). The expressed intent is to provide resources to speed implementation of statewide strategies designed to enable all schools to integrate technology fully into school curricula, so that all students become technologically literate, with the reading, math, science, and other core academic skills essential for their success in the 21st century.

Technology also can be used to connect teachers and parents to work together, link students to careers, colleges, and community resources and provide extended learning opportunities for students after school and during the summer. The first two years of the grants (1997-1998) focused primarily on providing computers in classrooms of low-income districts ($3,000,000). The next three years (1998-2001) focused the majority of the grants ($5,000,000) to schools on training teachers to use the technology in the classroom. A key purpose of this fund is to assist school systems that have the highest numbers or percentages of children in poverty and who demonstrate the greatest need for technology. The time line for the application process starts with application forms being sent to schools in November, completed applications due in January and the grants issued in April of each year. For information contact Jim Lukesh, Nebraska Department of Education, (402) 471-0531.

Preparing Tomorrows Teachers to Use Technology, Catalyst Grant.- Beginning in the fall of 1999, Nebraska received a federal grant in a total amount of 1.8 million dollars. Over a three-year period, the purpose to the grant is to assist all 17 of Nebraska's teacher preparation institutions in the design and implementation of technology into their teacher preparation programs. If successful, new teachers coming out of the 17 institutions will be more able to use technology as an effective tool in the K-12 classrooms. For more information contact: Dr. Dean Bergman, Nebraska Department of Education, (402) 471-5023.

CLASS Project (Communications, Learning, and Assessment in A Student-Centered System Project) The Department of Distance Education of the University of Nebraska-Lincoln will receive $17.5 million for the development of a fully accredited high school diploma sequence in a "seamless" electronic environment. Two and one half million of this award comes from the General Services Administration to get the project moving and a five-year $15 million award from the Star Schools program of the U.S. Department of Education.

In the CLASS Project, courses from the existing University of Nebraska-Lincoln Independent Study High School curriculum will be transformed from a basically linear, print-based delivery format to an on-line innovative, interactive immersion in learning. These courses will be stored on a server at the Distance Education Center at UNL. Learners can gain access to the course materials at locations that have Internet connections or modems. Beginning February 1, 1996 a sequence of prototypes will be produced with the earliest versions provided to the Project partners at six months after the inception of the Project. Subsequent versions will be delivered at approximately three-month intervals. For more information contact Charlotte Hazzard, Project Coordinator, phone (402) 472-0084. For more information on the marketing effort associated with this program see CLASS.com under the private funding section of this document.

Universal Services Fund- The Telecommunications Act of 1996 provides up to $2.25 billion a year nationally to enable public and private schools, educational service units and libraries to purchase at a discount any telecommunications service, internal connections among classrooms, and access to the Internet. The discounts run between 20 and 90 percent depending on the income level of a school or ESU as indicated by the percentage of children qualifying for free and reduced lunches. Nebraska schools have benefited in the reduction of line costs by approximately 5 million dollars the first year of the program and by 7 million the second year (1999-2000). Applications to qualify for the rate reductions (E-rate) are filed directly with the Federal Communications Commission in January of each year. One part of the application process requires the schools and ESUs to file and have certified a technology plan with the Nebraska Department of Education. For more information contact Wayne Fisher, Consultant at NDE at (402) 471- 2085.

ESEA Title VI- School districts have used ESEA Title VI allocations to support technology by purchasing computers, printers, software or other items supporting Internet connections. Each project is designed to assist the school district in meeting some component of its school improvement plan. The applications contain two sections that directly relate to the utilization of technology in a school. Those categories and the amounts distributed for the 6 years of 1994-2000 are as follows:

Year	Technology Related to Implementation School- based Reform	Acquisition of Computer Hardware and Software	Total
1994-95	$21,154	$676,839	$697,993
1995-96	$150,306	$544,001	$694,307
1996-97	$96,198	$459,834	$556,032
1997-98	$101,102	$527,477	$628,579
1998-99	$99,210	$493,642	$592,852
1999-00	$134,987	$437,961	$572,858

For information contact Mike Kissler, Nebraska Department of Education, (402) 471-2741.

PRIVATE FUNDING SOURCES

U. S. West/NSEA Teacher Network Project-   the U.S. West Foundation approved funding for a Nebraska K-12 teacher computer use-training project. The Nebraska State Education Association, in cooperation with the Nebraska Department of Education, was asked to serve as the vehicle through which this grant was planned and implemented. This project developed a statewide cadre of educators proficient at using computer-based telecommunications to improve teaching and learning. Two hundred and thirty-eight public and private school teachers were selected for the initial training. They in turn committed to train another 10 teachers each on the use of computer-based telecommunications. Each of the teachers were given one laptop computer and attended an intense two-day training session in the summer of 1997. Nebraska received a total of $687,225 for the project, of which $499,800 was for the purchase of 238 computers and the remaining $187,425 covered teacher training and related activities. This project has now ended. For information contact Liz Hoffman, Consultant, Nebraska Department of Education (402) 471-3503.

CLASS.com Marketing Project- In 2000 a marketing firm was created to promote and facilitate the use of the CLASS Project electronically delivered high school classes. Through private contributions, 8 million dollars was collected to "jump start" this project's efforts. Their purpose is to promote and help facilitate the use of the high school courses internationally. For more information contact Carole Burt, Sales Relationship Manager CLASS.Com, (402) 441-3053, caroleb@class.com.

Appendix H

INNOVATIVE FUNDING EXAMPLES

Funding in Arizona: A K-12 Perspective

Funding written by Joe Bunting, Tempe Elementary School District and Mike Emerson, Arizona State University

The following excepts related to funding recommendations are taken from: http://www.aztea.org/resources/whitepaper/funding.htm.

Recommendations

If technology is to become a regular and integral component of elementary and secondary education, its costs must come to be seen as a regular cost of doing business. If a program is treated as an add-on, as is the case when it is supported by external, categorical grants, experience has shown that it is unlikely to become deeply incorporated in a school and to survive the withdrawal of the grant. A nation of technology-rich schools cannot be built with special purpose, categorical funding (Getting America's Students Ready, 1996).

Funding for technology needs to be both universal and sustainable. One possible solution to the problem of state-wide technology funding deficit is to use the aggregate taxing and administrative power of the State of Arizona to assist schools in the purchase and maintenance of technology. While the State through the Arizona Department of Education has developed and deployed various technology projects in the past, there has been little attempt to develop a systemic and integrated approach to meet the local technology financing issues of schools.

Several other states have developed state-wide programs to assist their schools with technology funding issues. One approach by states such as Florida and Utah has been to allocate money directly from the legislature, either based on a per capita formula or through competitive challenge grants, to K-12 schools. Nebraska sets aside 12.5% of the proceeds from its state lottery for an Education Improvement Fund which funds special curriculum and technology projects in Nebraska schools. California, through its public-utility, has managed to provide schools with reduced telecommunications rates for service.

In each of these instances, the various state governments have used their fiscal or administrative powers to assist schools with acquiring and integrating technology. In some instances, state like California have also developed special competitive grant processes such as the "School-Based Education Technology Grants

Program" to encourage the development of a local community interest and partnership in a school's technology program.

Given these examples, the State of Arizona has a unique opportunity to enter into a partnership with Arizona K-12 schools. Some options include:

- *The establishment of a state fund to provide the necessary cash matches for federal and foundation grant initiatives;*
- *A "technology capital levy" funded by the State and to be assessed based on a school's per capita student enrollment that will provide additional dollars to help schools meet technology funding deficits;*
- *A state "challenge fund" that would fund unique and worthy proposals designed to showcase leading-edge technologies and curriculum in the classroom.*

$5.2 million in IT workforce grants from the Pennsylvania Department of Education

Pennsylvania legislators and Gov. Tom Ridge have directed $5.2 million in grants to more than 130 secondary and post-secondary schools in the state to support programs aimed at developing information technology (IT) and internet education. Known as Information Technology Workforce Development Grants, some of these programs will support curricula that will directly affect an estimated 2,600 K-12 students in Pennsylvania this year.

Innovative programs, such as web-programming summer camps for high schoolers, are intended to draw more students into IT fields. Other projects, such as internships with the Federal Communications Commission, will expose students to the wide variety of IT- and web-related careers that abound in the state. The project is part of Pennsylvania's multi-year Link to Learn program, which aims to expand the use of technology in the classroom.

ALERT- May 30, 2000

Bets, butts, and tax bungles enrich school technology funding

From eSchool News staff and wire service reports

Lawmakers in several states are tapping innovative sources to fund educational technology initiatives--from state lottery proceeds, to tobacco settlement money, to funds from late tax payments that were stuck in the mail.

In Georgia, state officials say residents' costly pursuit of the recent $363 million Big Game state lottery jackpot will result in additional money for school programs this year. Total Georgia lottery ticket sales hit a record high of $76.8 million in the

week ending May 8, roughly $30 million above a typical week and almost completely attributable to surging Big Game ticket sales, officials said.

Georgia directs a minimum of 35 percent of all gross sales of lottery tickets to school technology purchases, upgrades, and Internet connections, along with school construction and a handful of other educational programs. This school year, according to state officials, approximately $32.6 million has been raised from lottery proceeds, with each school system receiving a minimum of $53,000. When broken down, the figures indicate that each full-time student in Georgia was allotted $23.10 in lottery funds. "Almost all of the funds gained through the lottery have to be invested in things that will last, such as hardware, software, and connectivity," said Phil Thomas, Georgia's director of education technology.

The Georgia Department of Education also has earmarked $15.4 million to pay one technology specialist for every four K-12 schools in the state, according to Thomas. Lottery funds are used in addition to the $10.2 million granted to the state in the form of federal Technology Literacy Challenge Fund money, which is distributed to 82 schools across the state on a competitive basis.

Tobacco money

Some states have proposed using a portion of the states' $206 billion settlement with the tobacco industry as an innovative way to fund school technology programs. Oklahoma legislators currently are embroiled in a debate about what to do with their share of the settlement, which could amount to $42.3 billion in tobacco money over the next 25 years.

Republican Gov. Frank Keating has proposed using $500 million toward capital improvement bonds for higher education and common education technology in Oklahoma. State lawmakers oppose this budget proposal, preferring to use the money to build up an interest-bearing trust fund over the next 25 years and use the interest gained from that source to fund various projects.

"The bond program would have given us $100 million for technology funding. We're holding out hope, but right now we are still at gridlock," said Oklahoma Education Secretary Floyd Coppedge. Though he doubts whether the capital improvement bonds will be approved, Coppedge thinks programs like the one proposed in Oklahoma could be a boon to education. "We would have used that money to make sure all our schools are connected. Oklahoma has a large number of rural and small schools that can't deliver upper-level courses to their students," he said. With the extra money, "we could offer upper-level classes using an electronic delivery system."

Coppedge favors the governor's plan, believing it would help the state reach its technology goals much more quickly than a trust fund would. "The Keating plan has the greatest potential, because we can generate the largest amount of money for

*immediate use," he said. Legislators set a late May deadline for reaching a
decision.*

Budget surpluses

*California is also involved in a debate about how to spend approximately $600
million of the state's huge budget surplus to buy and maintain computers for its
schools.*
*California is well below the national average in students per computers, with one
computer for every 14.8 students. The proposed funding would place the state
above the national average of one computer for every 9.8 students, ensuring one
unit for every eight students in California public schools.*

*In his original January budget plan, Democratic Gov. Gray Davis said he would
earmark $200 million to purchase computers and train teachers, but in a May
revision of his budget plan, Davis increased that proposal by $400 million. The
$600 million in question would allow the state to buy up to 700,000 computers for
approximately $700 each, or 350,000 higher-end computers for about $1,500 each.
"That would really be a big leap toward putting computers in our schools," said
Ann Bancroft, a spokeswoman for the governor's Office of Education.*

*In an informative briefing, titled "Investing the Dividends of Prosperity: K-12
Education," Davis proposed spending $325 million on hardware and $50 million
on connectivity.*
*The plan would create 36 hubs across the state that would enable K-12 schools to
connect to the University of California's Internet2 backbone, which state officials
call "the backbone of next-generation internet connectivity."*

*Davis allotted $25 million for technology teacher training in his original
technology plan, but he doubled that figure in his May proposal. Top-priority
funding would be given to high schools that do not offer advanced placement
courses, allowing them access to online coursework. "Raising student achievement
is the governor's top priority, and this helps reach that goal by preparing students
for the information economy," said Bancroft.*
*Most California lawmakers expect this portion of the budget to pass. "This plan is
well-supported. Education technology is not a controversial part of the budget. We
feel pretty confident that at least that portion will be approved," Bancroft said.*
*According to state law, the budget must be completed by June 15 and signed by July
1, the start of the new fiscal year.*

Lost tax returns

*On the other coast, Connecticut has proposed using some "found" money to
improve K-12 technology funding. State budget officials announce in early May that
thousands of income tax returns, which had been stuck in the mail, will be raising
Connecticut's budget surplus to $100 million. Republican lawmakers in the state*

want to stick with the original budget surplus plan, which set aside any additional money from unforeseen sources to fund school technology and debt reduction.

According to the state budget plan, the first $10 million above the $250 million surplus that has already been spent would be used to connect classrooms to the internet. Any extra money would be used to pay for school construction. But some state Democrats are lobbying to initiate a tuition freeze at public colleges and universities, believing the surplus funds are better spent on higher education. Chris Cooper, press secretary for Republican Gov. John Rowland, explained that the two options were not necessarily mutually exclusive, but added that he did not believe the tuition freeze would take effect in the upcoming fiscal year. "The first $10 million of additional surplus will go directly to wiring schools," said Cooper. The state will use $5 million in surplus funding for high-speed voice and data programs intended to connect K-12 schools to state colleges and libraries, he added, and will use $2 million to create a statewide digital library. An additional $1.2 million will be allocated for distance learning, he said.

Related links:

California Dept. of Education
http://www.cde.ca.gov/
California Governor's Office
http://www.governor.ca.gov/
Connecticut Dept. of Education
http://www.state.ct.us/sde/
Connecticut Governor's Office
http://www.state.ct.us/governor/
Georgia Dept. of Education
http://www.doe.k12.ga.us/
Georgia Governor's Office
http://www.ganet.org/governor/
Oklahoma Dept. of Education
http://sde.state.ok.us/
Oklahoma Governor's Office
http://www.state.ok.us/~governor/

Appendix I

CISCO Networking Academies

Anselmo-Merna Schools	ESU 10--Kearney	Pierce Public Schools
Applied Information Management Institute (AIM)	Elkhorn Public Schools	Ralston High School
Beatrice Public Schools	Gering	Sioux County High School
Bellevue East High School	Grand Island Northwest High School	South Sioux City
Bellevue West High School	Grand Island Public Schools	Southeast Community College
Bruning-Davenport Unified School District	Hebron Public School	Southern School District 1--Wymore
Central Community College	Kearney High School	Tecumseh Public School
Centura Public Schools	Lexington High School	Tri County Pubic Schools--Dewitt
Chadron	Lincoln Public Schools	University of Nebraska at Kearney
Cozad City Schools	Metro Community College	Wakefield Community School
Crawford	Millard South High School	Western Nebraska Community College
Creighton University	Northeast Community College	Westside High School--Omaha
Daniel J. Gross High School--Omaha	Omaha Career Center	
District OR1 Schools--Palmyra	Ord Public Schools	
ESU 5--Beatrice	Papillion La Vista	

Appendix J

U.S. Department of Education
Office of Educational Technology
Technology Plan 2001

Objective 1.7: Schools use advanced technology for all students and teachers to improve
education.

<u>National Need</u>
National Concerns. Research has found that educational technology, when used
effectively, can significantly improve teaching and learning. To support schools in
incorporating technology into their curricula, the President has established the four pillars
of the Educational Technology Literacy Challenge:

1. All teachers in the Nation will have the training and support they need to help
    students learn using computers and the Internet.
2. All teachers and students will have modern multimedia computers in their
    classrooms.
3. Every classroom will be connected to the Internet.
4. Effective software and online learning resources will be an integral part of every
    school's curricula.

The educational resources of the Internet are growing rapidly. However, many students
and teachers, especially those in high-poverty or rural schools, have limited access to
these resources.

Our Role. We have made great progress toward our goals to put modern computers in
classrooms and connect them to the Internet. With increasing access to computers and
advanced telecommunications, we must ensure that teachers also have the ongoing
training and support they need to effectively use these investments for improved teaching
and learning.

In response to this significant need, the Administration's educational technology fiscal
year 2000 investments placed special emphasis on technology training for current and
prospective educators. These funds will help ensure that all new teachers can use
technology effectively in the classroom. In addition, the fiscal year 2001 budget requests
increased funding for closing the digital divide--especially for increasing access to
technology in communities with concentrations of disadvantaged students and their
families--as well as for developing the next generation of learning tools to address critical
educational needs.

The Department's educational technology initiatives include, among others, the Preparing
Tomorrow's Teachers to Use Technology program, the Technology Literacy Challenge
Fund, the Technology Innovation Challenge Grant and Star Schools programs, the
Community Technology Centers, and Learning Anytime Anywhere program.

Our Performance

How We Measure. The Technology Literacy Challenge envisions a 21st century in which all students are technologically literate. The aforementioned "four pillars" are the concrete goals that help define the task, and they are at the heart of the challenge. These goals also provide the basis for performance indicators against which the Department measures the National progress in areas of educational technology supported by its programs.

Indicator 1.7.a. The ratio of students per modern multimedia computer will improve to 5:1 by 2001.

Assessment of Progress. Positive trend toward target. Targets for this indicator are continual progress toward the 2001 target of five students per multimedia computer. Data show that the target of continual progress is being met and suggest that the goal of five students per multimedia computer will be achieved by 2001.

To make technology a viable instructional tool requires that schools have enough computers to provide full, easy access for all students. Citing Glennan and Melmed (1996), *Getting America's Students Ready for the 21*[st] *Century* (U.S. Department of Education, 1996) notes that many studies suggest that full, easy access requires a ratio of about five students to each multimedia computer. As shown in Figure 1.7.a.1, in 1996-97, the ratio of students per instructional computer was 7:3:1; by 1998-99, the ratio had dropped to 5.7:1. In 1996-97, the ratio of students per multimedia computer was 21:2:1; by 1998-99, it had dropped to 9.8:1. As the cost of computing power continues to decline, schools are increasingly able to afford multimedia computers and the newer hand-held technology devices.
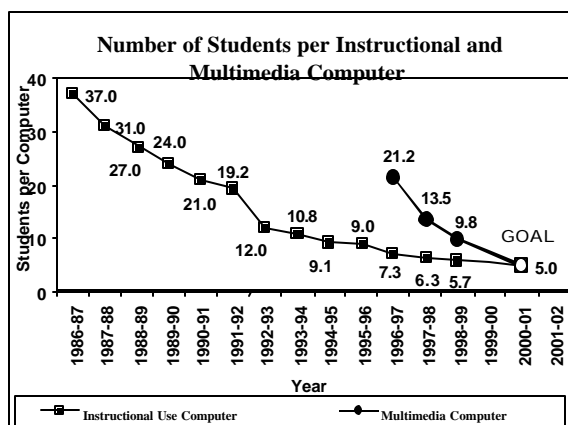

Figure 1.7.a.1

Source: Market Data Retrieval, *Technology in Education*, 1997, 1998, and 1999; Market Data Retrieval, 1997 as cited in Education Week, *Technology Counts*, 1997. *Frequency:* Annual. *Next Update*: Fall 2000 for the 1999-00 school year. **Validation procedure:** Data supplied by Market Data Retrieval. No formal verification or attestation procedure applied. **Limitations of data and planned improvements:** Market Data Retrieval data do not have consistently high response rates, and response rates vary substantially across sites. Accuracy of responses may vary considerably across districts and states. *Planned improvements:* None.

Indicator 1.7.b. The percentage of public school instructional rooms connected to the Internet will increase to 100 percent by 2000.

Assessment of Progress. Positive trend toward target. The target for this indicator is continual progress toward the 2000 target of 100 percent of instructional rooms connected to the Internet. Data show that the target of continual progress is being met.

Connections to the Internet make computers versatile and powerful learning tools by introducing students and teachers to new information, people, places, and ideas from around the world to which they might not otherwise be exposed. Figure 1.7.b.1 shows that in 1994 only 3 percent of instructional rooms were connected to the Internet. By 1999, 63 percent of classrooms were connected to the Internet. At this rate of progress, the goal of 100 percent by the year 2000 is likely to be met.
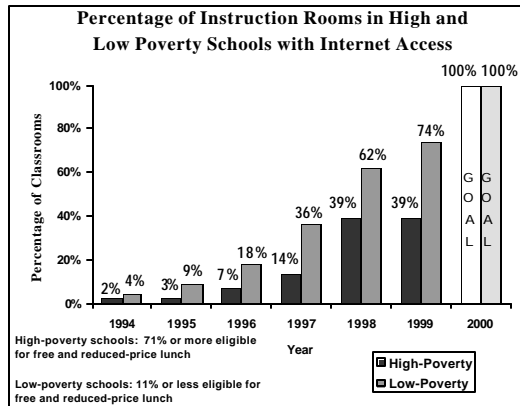
Figure 1.7.b.1

Percentage of Instructional Rooms with Internet Access
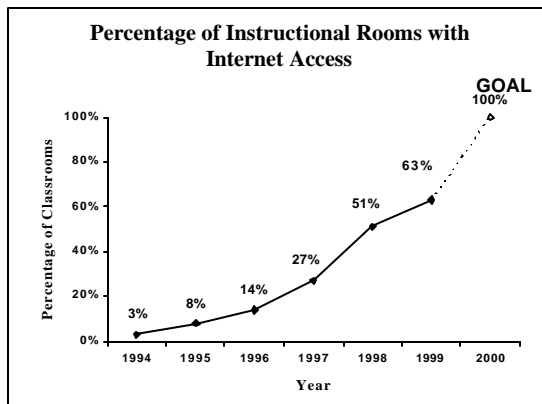
Source: National Center for Education Statistics (NCES), Internet Access in U.S. Public Schools and Classrooms: 1994-99, February 2000; Internet Access in U.S. Public Schools and Classrooms: 1994-1998, February 1999. *Frequency:* Annual. *Next Update:* February 2001 for fall 2000 data. **Validation procedure:** Data validated by NCES's review procedures and *NCES Statistical Standards.* **Limitations of data and planned improvements:** The measure looks at access to the Internet, but does not look at Internet use or the quality of that use. *Planned improvements:* None.

Indicator 1.7.c. Students in high-poverty schools will have access to educational technology that is comparable to the access of students in other schools.

Assessment of Progress. Positive trend toward target. Providing students with access to computers and using computers to support instruction requires significant investments in hardware, software, wiring, and professional development, yet school districts vary greatly in their capacity to fund these improvements. Internet access is a good measure of access to educational technology because it requires not only an Internet connection but also access to a computer. Research has documented differences in access between high-and low-poverty schools but also shows that access in all schools is increasing. In 1994, 2 percent of classrooms in high-poverty schools and 4 percent of classrooms in low-poverty schools had access to the Internet (see Figure 1.7.c.1). By 1999, the percentage of classrooms with Internet access had increased to 39 percent in high-poverty

schools and 74 percent in low-poverty schools. The Federal role in reducing these disparities is significant. In 1997-98, Federal funds paid for 50 percent of computers purchased for high-poverty schools and 14 percent of computers purchased for low-poverty schools (USED, *Study of Educational Resources and Federal Funding, 1999*).

Figure 1.7.c.1

Percentage of Instruction Rooms in High and Low Poverty Schools with Internet Access

High-poverty schools: 71% or more eligible for free and reduced-price lunch

Low-poverty schools: 11% or less eligible for free and reduced-price lunch

Source: NCES, Internet Access in Public Schools and Classrooms, February 1998; Internet Access in U.S. Public Schools and Classrooms, February 2000. *Frequency:* Annual *Next Update:* February 2001 for fall 2000 data. **Validation procedure:** Data validated by NCES's review procedures and *NCES Statistical Standards.* **Limitations of data and planned improvements:** Poverty measures are based on free and reduced-price school lunch data, which may underestimate school poverty levels, particularly for older students and immigrant students. *Planned improvements:* None.

Indicator 1.7.d. Students with disabilities will have access to educational technology that is, at a minimum, comparable to the access of other students.

Assessment of Progress. Target not met. Internet access is good measure of access to educational technology because it requires not only an Internet connection but also access to a computer. With the exception of moderate use, the availability of access to and extent of use of the Internet by students with disabilities is significantly less than for all students, though the magnitude of the difference is only a few percentage points. Advances in technology and universal design are making significant contributions to overcoming barriers to access for the disabled.

Figure 1.7.d.1

Availability and Use of the Internet by Students in Public Schools by Disability Status
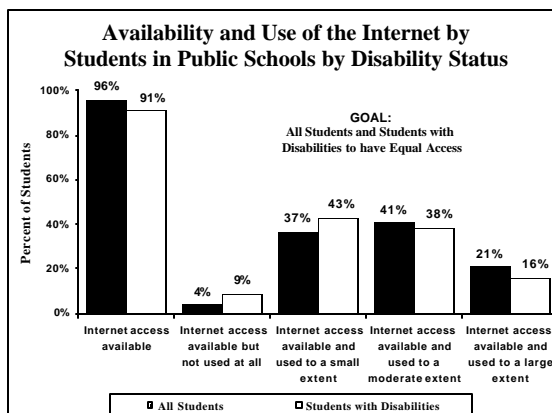
Source: NCES, Internet Access in U.S. Public Schools and Classrooms, February 2000, unpublished tabulations. *Frequency:* Annual. *Next Update:* February 2001 for fall 2000 data. **Validation procedure:** Data validated by NCES's review procedures and *NCES Statistical Standards.* **Limitations of data and planned improvements:** The measure looks at access to the Internet and extent of use but does not look at quality of use.

Indicator 1.7.e. By 2001, at least 50 percent of teachers will indicate that they feel very well prepared to integrate educational technology into instruction.

Assessment of Progress. No 1999 data, but progress toward target is likely. Computers, effective software, online learning resources, and the Internet hold promise to improve learning; increase the amount of time students spend learning; and engage students in problem solving, research, and data analysis. Teachers' integration of the use of technology into the curricula is a major determinant of technology's contribution to student learning, once access to computers is provided. In 1998, 20 percent of teachers reported that they were fully prepared to integrate technology in their instruction. Federal resources for training of teachers to use technology (including the Technology Literacy Challenge Fund, the Technology Innovation Challenge Grants, and Preparing Tomorrow's Teachers to Use Technology programs) as well as state and local funds continue to support professional development in the use of educational technology for teachers and, correspondingly, progress toward the target for this indicator.

Figure 1.7.e.1
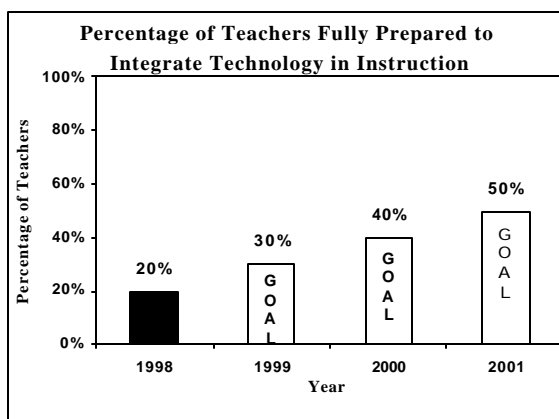
Source: NCES, *Teacher Quality: A Report on the Preparation and Qualifications of Public School Teachers*, January 1999. *Frequency:* Biennial *Next Update:* January 2001 with fall 2000 data. **Validation procedure:** Data validated by NCES's review procedures and *NCES Statistical Standards.* **Limitations of data and planned improvements:** The data are self-reported on feelings of preparedness rather than objective measures of teachers' actual classroom practice. The resources required, in terms of cost and burden, to regularly gather data other than self-report data on teacher preparedness for a Nationally representative sample are prohibitive. *Planned improvements:* None.

Indicator 1.7.f. Students will increasingly have access to educational technology in core academic subjects.

Assessment of Progress. No 1999 data, but positive trend toward target is likely. The benefits of computers in schools and classrooms can be multifaceted, ranging from increased student motivation to improved teacher skills and student achievement. Of key importance is the extent to which computers in classrooms serve as learning tools that improve student achievement and whether students acquire the technology literacy skills needed for the 21st century. According to the National Assessment of Educational Progress (NAEP), the use of computers in instruction has increased substantially in recent years. In 1978, 14 percent of 13-year-olds and 12 percent of 17-year-olds used computers when learning math. By 1996, these percentages increased to 54 percent and

42 percent respectively (see Figure 1.7.f.1). For writing instruction, 15 percent of students in grade 8 and 19 percent of those in grade 11 used computers in 1978; by 1996, 91 percent of grade 8 students and 96 percent of grade 11 students used computers (see Figure 1.7.f.2).
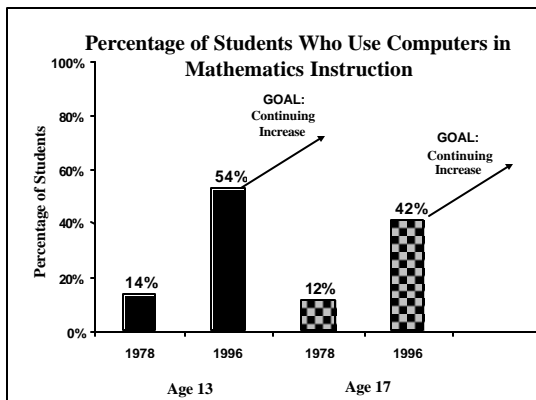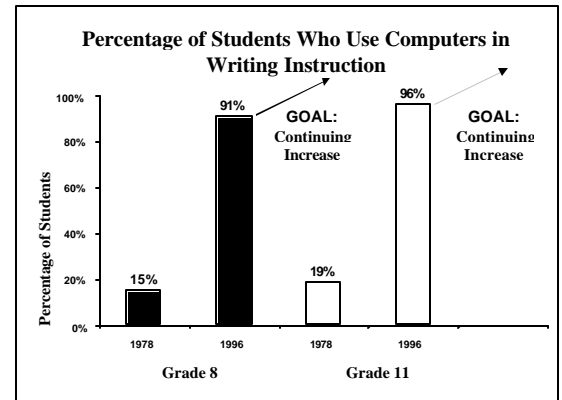
Figure 1.7.f.1

Figure 1.7.f.2

Percentage of Students Who Use Computers in Mathematics Instruction

Percentage of Students Who Use Computers in Writing Instruction

Source: National Assessment of Educational Progress (NAEP), 1978 and 1996. *Frequency:* Every 4 years per subject. *Next Update:* 2000 for 1999 data. **Validation procedure:** Data validated by NCES review procedures and *NCES Statistical Standards* **Limitations of data and planned improvements:** Questions yielding this data do not fully capture the extent to which computers are regularly used in classrooms to support instruction. For mathematics, NAEP asks students if they have ever studied math through computer instruction. For writing, NAEP asks students if they use a computer to write stories or papers. *Planned improvements:* None.

How We Plan to Achieve Our Objective

How ED's Activities Support the Achievement of this Objective. In addition to specific program initiatives, the Office of Educational Technology held a National conference in July 1999 on "Evaluating the Effectiveness of Technology," which will be followed up by a series of regional conferences starting in the summer of 2000. We are also funding work on the design of new evaluations and longitudinal studies that are National in scale, as well as the development of prototype assessment tools that incorporate the use of technology with a better understanding of the new skills that technology-using students need.

■ **Technology challenge programs.** Financial support for leveraging state and local initiatives for effective use of educational technology.
- Through the Technology Literacy Challenge Fund (TLCF), support grants to local districts to expand efforts to train teachers, purchase computers, connect classrooms to the Internet, and acquire, where necessary, high-quality educational software and online learning resources.
- Encourage states and local districts to devote at least 30 percent of their TLCF allocations to provide training and support to enable teachers to use technology efficiently in their classrooms.
- Provide evaluation tools and encourage states and districts to evaluate progress toward achieving the four National education technology goals and to evaluate the impact of education technology on student achievement.
- Use the Technology Innovation Challenge Grants appropriation to continue and expand partnerships among educators, business and industry, and other community organizations

to develop and demonstrate innovative applications of technology for effective use in the classroom. Build on the successes and lessons learned from this program and the Star Schools program in the Next Generation Technology Innovation program proposed to replace it.

■ **Teacher preparation for 21st century classrooms.**
- Use the Preparing Teachers to Use Technology program to make grants to teachers' colleges, other educational organizations, and consortia to help ensure that prospective teachers are prepared to integrate technology effectively into teaching when they enter the classroom.
- Encourage states to adopt technology standards that are included in the teacher certification and recertification process. Encourage higher education institutions to partner with the private sector to integrate educational technology into preservice teacher preparation.

■ **Technology connections, especially for high-poverty urban and rural schools and communities.**
- Encourage schools to greatly expand their use of technology through the E-rate, or Universal Service Program, created under the Telecommunications Act of 1996.
- Use funding for the Community Technology Centers initiative to address disparities in home access to educational technology by providing increased access to computers for students and adults in high-poverty urban and rural communities.

■ **Research and development.**
- Use the Interagency Education Research Initiative (IERI) to focus on the use of technology to promote improvements in teaching and learning targeted to early reading, English language literacy, and elementary mathematics and science.
- Support the development of next generation learning technologies through the proposed Next Generation Technology Innovation Program, which would provide funding for expanding knowledge about and developing new applications of educational technology and telecommunications for improving teaching and learning.

How We Coordinate with Other Federal Agencies

The Department of Education (ED) recognizes that, in addition to its oversight of the many Department programs described above, assistance and support from other Federal agencies is also important.

Increase school and community access to educational technology. The Department is cooperating with numerous agencies on an ongoing basis and encouraging the effective use of technology. ED is cooperating in this area with the White House National Economic Council, the White House Office of Science and Technology Policy, the Department of Commerce, the Department of Labor, and the Department of Housing and Urban Development.

Improve data collection. The Department provides support for the Census Bureau's Current Population Survey (CPS) to make possible the inclusion of questions on computer and Internet access at home.

Encourage research. The Department, the National Science Foundation, and the National Institute of Child Health and Human Development jointly fund an interagency research initiative that focuses on the use of information and computer technologies in improving school readiness for reading and mathematics, initial teaching of reading and mathematics, and teacher preparation

in reading, mathematics, and science. With the National Science Foundation, the Department cosponsored a study of educational technology and instructional practice.

Increase Internet access.   The Department collaborates with the Schools and Libraries Division at the Federal Communications Commission for effective implementation of the Universal Service rate for educational access for schools and libraries (the E-rate).

Challenges to Achieving Our Objective

The digital divide between low- and high-poverty schools is closing slowly, but the digital divide between low- and high-income homes is larger than that between schools— and it persists. Lack of access to and use of computers in the home for children of low-income families exacerbates inequalities stemming from lower rates of access to computers in high-poverty schools.

Although the recent GAO report *Telecommunications Technology: Federal Funding for Schools and Libraries* found no duplication among Department programs, we believe that a continued focus on strengthening the focus on equity, professional development, and effective implementation among the various educational technology programs within the Department is needed. In particular, given the rising level of interest in online advanced placement courses and online postsecondary degree programs, stronger connections are needed between the K-12 and postsecondary education communities in the area of distance learning. The Office of Educational Technology meets on a regular basis with all relevant program offices to ensure that connections are made and continuity is maintained.